U.S. DEPARTMENT OF COMMERCE
National Technical Information Service

PB-271 861

Existing and Potential Noise Reduction Technology for the Fabricated Metal Products Industry

IIT Research Inst, Chicago, Ill

Prepared for

Environmental Protection Agency, Washington, D C

Jul 75

TECHNICAL REPORT DATA
(Please read Instructions on the reverse before completing)

1. REPORT NO.	2.	3. RECIPIENT'S ACCESSION NO. PB-277 5[illegible]1
4. TITLE AND SUBTITLE Existing and Potential Noise Reduction Technology for the Fabricated Metal Products Industry.		5. REPORT DATE July 1975 6. PERFORMING ORGANIZATION CODE
7. AUTHOR(S) E.P. Bergmann		8. PERFORMING ORGANIZATION REPORT NO.
9. PERFORMING ORGANIZATION NAME AND ADDRESS IIT Research Institute 10 West 35th Street Chicago, Illinois 60616		10. PROGRAM ELEMENT NO. 11. CONTRACT/GRANT NO. EPA 68-01-2234
12. SPONSORING AGENCY NAME AND ADDRESS U.S. Environmental Protection Agency Office of Noise Abatement and Control 401 M Street, S.W. Washington, D.C. 20460		13. TYPE OF REPORT AND PERIOD COVERED Interim 14. SPONSORING AGENCY CODE 550/024
15. SUPPLEMENTARY NOTES		

16. ABSTRACT

This document is a Task Report. Effort was directed toward determining the existing and potential noise reduction technology for the fabricated metal products industry.

This report was submitted in partial fulfillment of Project Number J6331 Contract Number 68-01-2234, by IIT Research Institute, under sponsorship of the Environmental Protection Agency. Work was completed as of July 1975.

17. KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTORS	b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group

18. DISTRIBUTION STATEMENT Release Unlimited	19. SECURITY CLASS (This Report) Unclassified	21. NO. OF PAGES 284
	20. SECURITY CLASS (This page) Unclassified	22. PRICE PC A13 MF A01

EPA Form 2220-1 (9-73)

PB 271 861

July 1975

EXISTING AND POTENTIAL NOISE REDUCTION TECHNOLOGY FOR THE FABRICATED METAL PRODUCTS INDUSTRY

Task Report J6331

by

E. P. Bergmann

Contract 68-01-2234

Project Officer

E. Berkau

U.S. Environmental Protection Agency
Industrial Environmental Research Lab.
Cincinnati, Ohio 45268

Prepared for

Environmental Protection Agency
Office of Research and Development
Washington D.C. 20460

REPRODUCED BY
NATIONAL TECHNICAL
INFORMATION SERVICE
U.S. DEPARTMENT OF COMMERCE
SPRINGFIELD, VA. 22161

ABSTRACT

This document entitled "Existing and Potential Noise Reduction Technology for the Fabricated Metal Products Industry", is a Task Report. Effort was directed toward determining the existing and potential noise reduction technology for the fabricated metal products industry.

This report was submitted in partial fulfillment of Project Number J6131 Contract Number 68-01-2234, by IIT Research Institute, under sponsorship of the Environmental Protection Agency. Work was completed as of July 1975.

CONTENTS

Page

Abstract ii

List of Tables iv

Acknowledgments v

Sections

I Conclusions 1

II Recommendations 2

III Introduction and Summary 3

IV Noise Technology 6

Data Source 6
Data Sheets 6
Summary of Data Distribution and Information 7

V Distribution of Noise Treatments 18

Distribution of Noise Treatments by Machine Types 18
Distribution of Noise Treatments by Subassemblies or Components 19

VI Identification and Distribution of Existing Technology 32

VII Potential of Transferring Technology from Federally Funded Programs 42

VIII Technology Needed 48

The Underlying Problem 48
Basis for Establishing the Need and Priority of Applied Research 49
Machine Related Areas in Which Noise Control Technology is Needed 49
Subsystem Related Areas Needing Technology 50

IX References 51

Appendix: Data Sheets 53

TABLES

No.		Page
1	Machinery Noise Data Sheet	9
2	Summary of Data Sheet Distribution over the Industries	10
3	Distribution of Data	11
4	Distribution of Data	15
5	Summary of Machine Noise Levels and Treatments	20
6	Subsystem/Component Noise Sources and Treatments	25
7	Applicability, Cost and Effectiveness of Noise Reduction Treatments	36
8	Demonstrated Technology	39
9	Subsystems for Which Noise Treatments was Identified	40
10	Distribution of Noise Treatments over Subassemblies	41
11	Potential of Transferring Advance Noise Reduction Technology from Federal Programs to Industry	44
12	Potential Distribution of Federally Developed Noise Reduction Technology over Machinery Subsystems	47

ACKNOWLEDGMENTS

Technical counseling within IIT Research Institute was provided by Dr. R. S. Norman.

Technical guidance and assistance were provided by Dr. E. Berkau and S. Cordle of the Environmental Protection Agency.

SECTION I

CONCLUSIONS

Based on a review of the machinery noise data base relevant to the fabricated metal products industry these conclusions are offered:

- The open literature contains a significant number of articles on machinery noise reduction treatments.
- OSHA files are potentially a valuable source of data on machinery noise levels, treatments, costs and effectiveness of treatments.
- The most effective and widely used noise reduction treatment for existing machinery is the enclosure.
- Process substitution, whereby a quiet machine is substituted for a noisy one, is a viable alternative for particular applications.
- Reworking or retrofitting existing machines generally requires the application of several subsystem noise reduction treatments to effect a significant (>10 dBA) level of noise reduction.
- There exists a potential for transferring noise reduction technology from federally funded programs to the industrial sector for machinery noise control.
- Papers and articles describe the isolation of noise sources, noise treatments, and the effectiveness of the treatments. Relatively few are well enough documented to allow the duplication of the treatment. Virtually none allows a quantifiable extension of the treatment to other machines or subsystems. The technology of noise control needs to be brought out of the realm of an art into that of a science.

Reproduced from best available copy.

SECTION II

RECOMMENDATIONS

The following recommendations are offered:

- The OSHA data sheets provide meaningful information on machinery noise reduction treatments. These sheets should be expanded to more clearly define the data and a greater effort should be made to complete the needed information. Company and product identification can be expunged to protect the anonymity of the source.
- It is generally acknowledged that a theoretical noise analysis of a machine or a subassembly is beyond the current state-of-the-art except for relatively simple mechanisms. The approach to an improved understanding of noise control must, therefore, follow an empirical methodology which, in turn, leads to cause and effect relationships which can be quantified, applied and extended. In turn, these relationships can be examined in order to generate a meaningful theoretical understanding of the noise generation and control mechanism.
- Of the machine types identified as relating to the fabricated metal products industry only about 32 percent had indications of some sort of noise reduction treatment - other than enclosures. It is also evident that these treatments were extended over relatively few of the subassemblies. A broader, more definitive data base is needed. There is a need, therefore, to conduct a complete survey of noise levels (dBA) by machine type and identify and quantitize the noise output (dB and frequency) of the major subassemblies. The results of this survey, coupled with the number of workers exposed to each machine type will form a firm basis for establishing the need and the priorities for noise control research.
- An area of needed noise control technology is a systematic investigation of the functions of each production and nonproduction, metal cutting and metal forming machine type. Existing and alternate functions should be investigated in terms of noise, efficiency and alternative methods of performing the job. It is probable that similar functions will be identifiable across a range of machine types and that noise and efficiency treatments will have an equal range of applicability.

SECTION III

INTRODUCTION AND SUMMARY

The objectives of this effort were to:

- Gather pertinent Federal and private data on noise reduction treatments and distribute it through the machines of the fabricated metal products industry.
- Identify existing technology. Noise reduction practices which have been applied to particular machines are identified, described, and, where possible, quantified as to the level of noise reduction achieved or possible. Areas of potential transfer of demonstrated technology are identified for other machines with similar functions.
- Identify potential technology. Federal programs and other appropriate sources are reviewed with the intent of identifying areas in which advanced technology can be transferred to achieve industrial machinery noise reduction. This was accomplished by identifying common functions and the noise reduction achieved or possible.
- Identify areas in which technology is needed. It became apparent that there are machine groups for which no noise reduction measures have been applied and no existing or potential technology appears to be directly applicable. These "holes" are identified as areas in which technology is needed. Where possible, these areas are identified relative to machine functions to narrow the scope and increase the potential application.

The tasks relating to these objectives were completed and are reported in this document. Accomplishments of this effort include:

- 151 articles, paers, abstracts, and OSHA noise file cards were reviewed, processed into data sheets and distributed over 19 industries.
- Noise treatments were identified and segregated by machine class, machine type, subassemblies and components.

Reproduced from
best available copy.

- Federal programs were reviewed, areas of noise reduction research with potential application to industrial machinery noise were identified and the potential applications were distributed over the major subassemblies.
- Areas of needed technology were identified from both machinery and subassembly applications.

The findings of this study are summarized:

- Noise Technology Data. Although the primary thrust of the data gathering activity was directed toward the fabricated metal products industry the data collected was found to be germain to 11 industries. A review of these data indicated:

  Information on noise level before treatment was given in 84 percent of the cases,

  Noise levels after treatment were given 58 percent of the time,

  Cost data was available on 25 percent of the cases,

  The treatment used was described nearly every time (98 percent), and

  Relatively little information was available on materials, design practices, analysis, deleterious effects and measurement techniques.

- Identification and Distribution of Existing Technology. The most common noise reduction treatment, and the most effective, is the use of an enclosure. The effectiveness of enclosures varied from a high of 24 dBA to a low of 5 dBA noise reduction. Costs varied from $25,000 to $450 per enclosure. Process substitution is also a viable noise reduction treatment in particular cases. Component treatments are usually combined to achieve meaningful levels of noise reduction.
- Potential of Transferring Technology From Federally Funded Programs. Federally funded aircraft, surface transportation and machinery noise reduction programs were reviewed for applicability to the industrial machinery noise problem. Based on this review it is evident that a significant technology transfer potential exists. Both development and basic research federal programs are identified.
- Technology Needed. Needed technology includes: A systematic investigation of the functions of each machine in terms of noise and efficiency to establish quiet and efficient means of performing the overall functions; quantitized cause and effect relationships for mechanical, electrical, hydraulic and pneumatic systems; a fundamental understanding of the cutting and forming process noise generation and reduction; and a fundamental understanding

of absorption and damping materials in terms of material properties with respect to sound pressure, energy and frequencies.

As an overall summary, it is apparent that a good deal of information on noise reduction treatments exists in the open literature. However, except for a few isolated instances the treatments are not well enough documented to allow either duplication or meaningful extensions of the previous work. Most treatment discussions are in the form of generalities and are results-oriented. These types of discussions can be expected in industrial applications where the investigator's primary job is to get a quiet machine at the lowest cost. The result, however, is that a scientific, quantitized cause and effect technology base is virtually nonexistent and must be established if efficient noise reduction treatments are to be effected.

Reproduced from best available copy.

SECTION IV

NOISE TECHNOLOGY DATA

DATA SOURCE

Abstracts collected from a previous literature search of the Engineering Index and Pollution Abstracts (Reference 1) were reviewed and articles which appeared to be pertinent to this study were gathered. In addition the Environmental Information System (ENVIRON), a product of the Environmental Protection Agency, was searched for pertinent machinery noise abstracts, and OSHA files were searched for data on machinery noise levels and treatments.

DATA SHEETS

As articles and information were gathered they were reviewed and summarized on data sheets. These sheets, illustrated as Table 1, provided a uniform basis for recording quantitized information on machinery noise treatments while maintaining anonymity of particular machine trade names and companies with noise problems. The data sheets: are compiled as an appendix to this report; are included as Reference 2 to simplify the reference callouts; and serve as the primary data base for the noise treatment discussions.

SUMMARY OF DATA DISTRIBUTION AND INFORMATION

Although the primary thrust of this study is in the fabricated metal products industry the data collected were often found to be germain to other industries. Rather than discard these peripheral data, the data sheets were completed and segregated by industry. Table 2 is a summary compilation of the data sheet distribution over the industries. The total number of data sheets as well as the source of the information are illustrated. Note:

- Of the 151 data sheets 72 were made up from information taken from the OSHA file. Thirty-six were based on ENVIRON abstracts and 43 were from open literature publications. It was noted that duplicates between OSHA, ENVIRON and open literature sources of information existed. For those cases the open literature articles were listed as the prime source and the data sheets from other sources were discarded.
- The distribution of the 87 data sheets within the fabricated metal products industry shows approximately the same information source distribution as does the overall distribution. In this instance, however, the OSHA file is the major source of data
- Thirteen of the 19 industries had some machinery noise data. The primary metals industry in particular had a significant number of data sheets considering that it was not the primary target of the search. The machinery except electrical industry with one data sheet is deceptively low since many of the fabricated metal products data sheets are also directly applicable to that industry.

Table 3 is a compilation of the distribution of the type of data gathered by industry and machine type. Each industry for which data sheets were made up is included in Table 3 except the fabricated metal products industry. Data from that industry is compiled in Table 4. In general, trends noted from an inspection of Table 4 are applicable to the other industries. These trends include:

- Data on noise level before treatment is available on 84 percent of the sheets
- Data on noise level after treatment is available on 68 percent of the sheets.
- Cost data availability is 25 percent.

- The treatment used is nearly always given (98 percent).
- Little information is given on materials (30 percent), design practices (25 percent) analysis (2 percent), deleterious effects (8 percent), or measurement techniques (18 percent).

Table 1. MACHINERY NOISE DATA SHEET

Industry: ______________________________ SIC: ________

Machine/Area: ______________________________

Noise Level before Treatment: __________ dBA

Noise Level after Treatment: __________ dBA

Cost of Treatment: $__________

Treatment and Technology Used: ______________________________

- Materials: ______________________________
- Design Practices: ______________________________
- Analysis Techniques: ______________________________

Deleterious Effects of Treatment: ______________________________

Measurement Techniques Used: ______________________________

Sponsor of Work: ______________________________

Comments: ______________________________

Source: ______________________________

Table 2. SUMMARY OF DATA SHEET DISTRIBUTION OVER THE INDUSTRIES

SIC	Industry	Number of Data Sheets	Source of Information		
			OSHA File	Environ	Literature Search
20	Food and Kindred Products	4	3	1	
21	Tobacco Manufacturers	0			
22	Textile Mill Products	0			
23	Apparel and Related Products	1			1
24	Lumber and Wood Products	5	3	2	
25	Furniture and Fixtures	0			
26	Paper and Allied Products	1		1	
27	Printing, Publishing	1	1		
28	Chemical and Allied Products	4		4	
29	Petroleum and Coal Products	7	3	3	1
30	Rubber and Plastic Products	1		1	
31	Leather and Leather Goods	0			
32	Stone, Clay and Glass Products	4	4		
33	Primary Metal Industries	31	11	1	19
34	Fabricated Metal Products	87	50	16	21
35	Machinery, Except Electrical	1	1		
36	Electrical and Electronic Machinery	0			
37	Transportation Equipment	0			
38	Utilities	4		3	1
	Total	151	76	32	43

Reproduced from best available copy.

Table 1. DISTRIBUTIONS OF DATA

Machine Type	Noise Level before Treatment	Noise Level after Treatment	Cost	Treatment Used	Materials Used	Design Practice	Analysis Techniques	Deleterious Effects	Measurement Techniques	Sponsor	Total Number of Data Sheets
Food and Kindred Products - SIC 20											
Bottling Line Operation	1	0	0	1	0	0	0	0	0	1	1
Bodymaker	1	1	1	1	1	0	0	1	0	1	1
Assembly Line	1	0	0	0	0	1	0	0	0	1	1
Can Fabricating Machine	1	1	0	1	0	1	0	0	0	1	1
Apparel and Related Products - SIC 23											
Tack Driver	1	1	0	1	0	0	1	0	1	0	1
Lumber and Wood Products - SIC 24											
Wood Chipping Factory	0	0	0	1	0	0	0	0	0	1	1
Saws and Jointer	0	0	1	1	0	0	0	0	0	1	1
Chain Saw	0	0	0	1	0	0	0	0	1	1	1
Radial Arm Saw	1	1	1	1	0	1	0	0	0	1	1
Molding and Millworking Plant	0	0	1	1	0	0	0	0	0	1	1

Table 1 (continued). DISTRIBUTION OF DATA

Machine Type	Noise Level before Treatment	Noise Level after Treatment	Cost	Treatment Used	Materials Used	Design Practice	Analysis Technique	Deleterious Effects	Measurement Technique	Sponsor	Total Number of Data Sheets
Paper and Allied Products - SIC 26											
Printing and Allied Products - SIC 27											
Paper Converting Machinery	0	0	0	1	1	0	0	0	1	1	1
Folding Machine	1	1	0	1	0	0	[illegible]	1	[illegible]	1	1
Chemical and Allied Products - SIC 28											
Valves	0	0	0	3	[illegible]	2	0	0	0	1	3
Pump	1	1	0	1	0	0	0	0	0	1	1
Petroleum and Coal Products - SIC 29											
Gas Handling Systems	0	0	0	1	0	[illegible]	0	0	0	1	1
Pneumatic Rock Drill	0	0	0	1	0	0	0	0	0	1	1
Electro-mechanical Vibrator	1	1	0	1	1	0	1	0	1	1	1
Coal Cleaning Plant	1	0	1	1	0	[illegible]	0	0	0	[illegible]	4
Rubber and Plastic Products - SIC 30											
Molding Shop	0	0	0	1	0	0	0	2	0	1	1

Table 3 (continued). DISTRIBUTION OF DATA

Machine Type	Noise Level before Treatment	Noise Level after Treatment	Cost	Treatment Used	Materials Used	Design Practice	Analysis Techniques	Deleterious Effects	Measurement Techniques	Sponsor	Total Number of Data Sheets
					Stone, Clay and Glass Products - SIC 32						
Eyeglass Assembly Line	1	1	0	1	1	1	0	0	0	1	1
Top Profiler	1	0	0	1	0	1	0	0	0	1	1
Side Profiler	1	0	0	1	0	1	0	0	0	1	1
Stone Saw	1	0	0	0	0	0	0	0	0	1	1
					Primary Metals - SIC 33						
Foundry Equipment	1	0	0	1	0	0	0	0	0	1	1
Core Room Operations	1	0	0	1	0	1	2	0	0	1	[illegible]
Rolling Mill	1	1	0	1	0	1	0	0	0	1	1
Knockout/Shakeout	5	3	0	3	3	0	0	6	0	3	6
Tumblers	7	6	1	6	6	3	0	0	3	5	7
Chippers	3	1	0	1	0	1	0	0	0	[illegible]	3
Pushup Machine	1	0	0	0	0	0	0	0	0	0	1
Jolt-Squeeze Machine	1	0	0	0	0	0	0	0	0	0	1
Pneumatic Ram	1	0	0	0	0	0	0	0	0	0	1
Core Blower	1	0	0	0	0	0	0	0	0	0	1
Grinder	2	0	0	0	0	0	0	0	0	1	2

Table 1 (concluded). DISTRIBUTION OF DATA

Machine Type	Noise Level before Treatment	Noise Level after Treatment	Cost	Treatment Used	Materials Used	Design Practice	Analysis Techniques	Deleterious Effects	Measurement Techniques	Sponsor	Total Number of Data Sheets
Primary Metal Products - SIC 33											
Pre-Mix Burner	1	0	0	0	0	0	0	0	0	0	1
Electric Furnace	1	0	0	0	0	0	0	0	0	0	1
Air Hoist	1	0	0	0	0	0	0	0	0	0	1
Sand Slinger	1	0	0	0	0	0	0	0	0	0	1
Acetylene Welding Equipment	1	0	0	0	0	0	0	0	0	1	1
Machinery Except Electrical - SIC 35											
Die Room	0	0	0	1	0	0	0	0	0	1	1
Utilities - SIC 49											
Power Plant	1	1	0	0	0	0	0	0	0	1	1
Steam Pipeline	0	0	0	1	0	0	0	0	0	1	1
Diesel Fuel Injection Pump	1	1	0	1	1	1	0	0	0	1	1
Steam Turbine	1	0	0	1	1	0	0	0	0	1	1

[illegible]

Machine Type	Noise Level before Treatment	Noise Level after Treatment	Cost	Treatment Used	Materials Used	Design Practice	Analysis Techniques	Deleterious Effects	Measurement Technique	Sponsor	Total Number of Data Sheets
					Fabricated Metal Products - SIC 34						
Cutoff Saw	2	2	2	2	0	0	0	1	0	2	2
Pin Machine	1	1	1	1	0	0	0	0	0	1	1
Welding Machine	1	0	0	1	1	0	0	0	0	1	1
Grinders	6	5	3	6	1	0	0	0	1	7	7
Wire and Cable Drawing Machines	2	1	1	2	1	2	0	0	0	2	2
Cablemaking Machines	3	2	0	3	1	1	1	1	1	3	3
Twisting Machines	2	2	1	2	1	1	0	0	0	2	2
Metallizing Process	1	1	1	1	0	0	0	0	0	1	1
Planer	1	1	1	1	0	1	0	0	0	1	1
Milling Machines	2	1	0	3	3	1	0	2	1	3	3
Lathes	2	2	0	2	0	0	0	0	2	2	3
Screw Machines	3	3	0	3	1	0	0	0	1	3	3
Shaper	1	1	1	1	1	0	0	0	0	1	1
Horizontal Boring Machine	1	1	0	2	1	1	0	1	0	2	2
Grippers	4	3	1	4	1	0	0	0	0	4	6
Deburring Machines	2	2	2	2	0	2	0	0	0	2	2

Table 4 (continued). DISTRIBUTION OF DATA

Machine Type	Noise Level before Treatment	Noise Level after Treatment	Cost	Treatment Used	Materials Used	Design Practice	Analysis Techniques	Deleterious Effects	Measurement Techniques	Sponsor	Total Number of Data Sheets
Bead Spinners	1	1	1	1	0	0	0	0	0	1	1
Perforators and Blanking Presses	2	2	1	2	0	1	0	0	1	2	2
Shears	2	2	0	2	0	2	0	0	1	2	2
Screwplate Press	1	0	0	1	0	0	0	0	0	1	1
Forge	3	1	0	3	1	1	0	0	1	3	3
Power Presses	3	3	0	3	2	0	0	0	1	3	3
Cold Header	4	4	1	5	0	0	0	0	0	5	5
Staple Forming Machine Machine	1	1	1	1	0	0	0	0	0	1	1
Swager	1	1	1	1	0	1	0	0	0	1	1
Punch Press	14	12	3	16	7	4	0	1	5	16	16
Riveting	1	0	0	1	0	0	0	0	1	0	1
Swaging	0	1	0	1	0	0	0	0	0	1	1
Magazine Bar Feed Machine	1	0	0	1	0	0	0	0	0	1	1
Vibratory Feeder	1	1	0	1	1	1	1	1	0	1	1

Table 4 (concluded). DISTRIBUTION OF DATA

Machine Type	Noise Level before Treatment	Noise Level after Treatment	Cost	Treatment Used	Materials Used	Design Practice	Analysis Techniques	Deleterious Effects	Measurement Techniques	Sponsor	Total Number of Data Sheets
Centrifuge	4	1	0	1	1	1	0	0	0	1	1
Vibrator	1	0	0	1	1	0	0	0	0	1	1
Compressor	1	1	0	7	1	0	0	0	0	7	7
Shot Blasting	1	0	0	1	0	0	0	0	1	1	1
Total	73	59	22	85	26	22	2	7	26	85	87

Reproduced from best available copy.

SECTION V

DISTRIBUTION OF NOISE TREATMENTS

The data sheets (Reference 3) were scanned and divided into two general categories; machines and subsystems. Data was then extracted and compiled within each category.

DISTRIBUTION OF NOISE TREATMENTS BY MACHINE TYPES

Noise treatment data relative to machines is compiled in Table 3. In particular data are compiled on:

- Machine Class. Relates to the general function of the machines within the class such as metal cutting machines, metal forming machines, etc.
- Machine Type. Relates to the general machine type such as cutoff saw, milling machine, etc. Not enough data was available to provide meaningful information on particular types.
- Typical Noise Level Before Treatment. These levels are expressed in dBA and should be considered as characteristic information on measurement location, instruments, etc., preclude particular information.
- Major Noise Sources.
- Treatments. Used to reduce the noise levels.
- Typical Cost of Treatments. Are given as received. Engineering, labor and material cost breakdowns are not available nor is it possible to establish whether the costs have any associated burdens.
- Typical Noise Reductions. As with typical noise levels before treatment the reductions should be considered as characteristic rather than particular.

Particular inferences on machine noise treatments are made in Section VI of this report.

DISTRIBUTION OF NOISE TREATMENTS BY SUBASSEMBLIES OR COMPONENTS

Noise treatment data relative to subassemblies or components is compiled in Table 6. Table elements are: the subsystem or component; the primary noise source(s); and the treatment used or recommended to reduce the noise level. Three trends are noted: the treatments are more detailed for subassemblies than for machines; little quantitized data are presented; and virtually no cost or effectiveness data are presented.

Table 5. SUMMARY OF MACHINE NOISE LEVELS AND TREATMENTS

Machine Class	Machine Type	Typical Noise Level before Treatment (dBA)	Major Noise Sources	Treatments	Typical Cost of Treatment ($)	Typical Noise Reductions (dBA)
Metal Cutting Machines	Cut-off Saw	112		Enclosure	900	24
	Milling Machine	110	Workpiece Vibration	Damped Workpiece		14
	Vertical Turret Lathe	111	Tool Vibration	Damped Tool Holder		10
	Vertical Turret Lathe (3 Rams)	93	Hydraulic Drive	Custom Designed Hydraulic Acoustic Filter		20
	Horizontal Boring Machine	92	● Pump ● Motor ● Bearings	● Reduced Pump and Motor Speed ● Isolated Motor, Pump and Fittings ● Honed Roller Bearings ● Partial Enclosure		8
	Automatic Screw Machine	97		Enclosure		19
	Automatic Screw Machine	94	● Stock Vibration ● Cutting Tool Vibration	● Stock Tube Inserts ● Enclose Cutting Tools		7
	Pneumatic Grinding Machine	106		Muffled Air Exhaust	25	15
	Weld Grinder	105		Replaced Grinder with Belt Sander	1206	12
	Hand Weld Grinders	99		Enclosure		10

Table 5 (continued). SUMMARY OF MACHINE NOISE LEVELS AND TREATMENTS

Machine Class	Machine Type	Typical Noise Level Before Treatment (dBA)	Major Noise Sources	Treatments	Typical Cost of Treatment ($)	Typical Noise Reductions (dBA)
Metal Cutting Machines.	Plate Grinder	108		Replaced Grinder with Planer	15,000	23
	Plate Planer	85				
	Shaper	103		Enclosure	450	5
Metal Forming Machines	Hydraulic Press (900 ton)	100		Damping Material on Outside of Parts Handling Chutes		6
	Heat Spinner	95		New Cam.		1
	Perforator	98		Enclosure	550	12
	Blanking Press	99	● Frame ● Die ● Clutch ● Stripper ● Ram ● Press ● Punch ● Workpiece Supply ● Workpiece Discharge	Enclosure		23
	Shears	100	Workpiece Transfer	Cover and Fill Rollers with Damping Material		11
	Pneumatic Shear	96	Exhaust	Mufflers		6

Table 3 (Continued). SUMMARY OF MACHINE NOISE LEVELS AND TREATMENTS

Machine Class	Machine Type	Typical Noise Level before Treatment (dBA)	Major Noise Sources	Treatments	Typical Cost of Treatment ($)	Typical Noise Reductions (dBA)
Metal Forming Machines	Cold Header	97		Enclosure	3000	12
	Staple Forming Machine	101		Enclosure	~5,000	12
	Swager	117		Enclosure	9000	12
	Punch Press	100	● Die ● Stripper	● Increased Number of Steps ● Substitute Mechanical for Air Parts Ejection ● Add Cushioner under Die Block ● Enclose Die Area		15
	Punch Press	108		Enclosure	1900	17
	Screwplate Press	95		Enclosure		
	Drop Forge	106				
	Forging Machine	98	Blower	Blower Moved to Outside Location		
	Upset Forging Press	108	Hydraulic Pump	Pump and Lines Were Covered with Damping Material		15

Table 3 (Continued). SUMMARY OF MACHINE NOISE LEVELS AND REDUCTIONS

Machine Class	Machine Type	Typical Noise Level Before Treatment (dBA)	Major Noise Sources	Treatments	Typical Cost of Treatment ($)	Typical Noise Reductions (dBA)
Metal Forming Machines	Power Press (20 ton)	98		Enclosure		
	Pin Machine	104		Enclosure	1000	20
	Wire Drawing Machine	93	• Air Wipes • Motor • Drive	• Enclosed Air Wipes, Motors and Belts • Changed from Cog Belts to V-Belts • Installed Plastic Gears in Gear Train (Plastic/Steel Gear Mix)	20,000	4
	Wire and Cable Insulating Machine	99	Air Wipes	Resized Wiper Seals		11
	Cablemaking Machine	103	• Bearings • Drive	• Partial Enclosure • Change Bearing Type • Close Tolerances on Gearing		10
Joining Equipment	Automatic Spot Welding Machine	96		Enclosure		
	Riveting	121		Switch to Welding		6

Table 5 (Concluded). SUMMARY OF MACHINE NOISE LEVELS AND TREATMENTS

Machine Class	Machine Type	Typical Noise Level before Treatment (dBA)	Major Noise Sources	Treatments	Typical Cost of Treatment ($)	Typical Noise Reductions (dBA)
Metallizing Equipment	Metallizing Machine	103		Enclosure	2500	26
Other Machines	Twisting Machine	97		Enclosure	7100	8
	Chipping Hammers	115		Replaced Chipping Hammers with Acetylene Torches		20
	Air Hammers	120		Enclosure		12
	Deburring Machine	107		Enclosure	1400	15
	Tumbling Barrel	101	● Action of Parts against Barrel ● Action of Parts against Parts	Lined Barrel, Inside and Outside, with Rubber	1500	11
	Tumbling Barrel	101		Enclosure		12
	Magazine Bar Feed Machine	96		Enclosure		11

Table 6. SUBSYSTEM/COMPONENT NOISE SOURCES AND TREATMENTS

Subsystem/ Component	Noise Source	Treatment
Gears/Gear Trains	● Load Fluctuations on Teeth ● Elastic Vibration of the Teeth and Gear Bodies	● Lap Tooth Surface. ● Use Finest Pitch Allowable. ● Use Lowest Pressure Angle. ● Maximum Recess and Minimum Approach. ● Tip and Root Relief. ● Overlap Ratio to be Exactly Integral - at least 2.0. ● Alternate Hard Pinions with Soft Gears. ● Alternate Steel and Nylon Gears.
	Bearings	● Use Sleeve Bearings in Preference to Antifriction Bearings. ● Use Highest Viscosity Lubricant Possible.
	Misalignment	● Controlled Assembly. ● Rubber or Neoprene Bushings. ● Parallel Gearing Preferred to Crossed-Axis Gearing.
Antifriction Bearings	● Contamination ● Brinelling ● Bearings become Magnetized ● Arcing from Stray Electricity Causes Pits	● Keep Oil Clean ● Maintain Seals ● Design to Static Load ● Electrically Isolate Bearings

Table 6 (continued). SUBSYSTEM/COMPONENT NOISE SOURCES AND TREATMENTS

Subsystem/ Component	Noise Source	Treatment
Toothed Belt Drive	Belt/Pulley/Sheave Interactions	• Use Soft Material at Bottom Lands of Belt or Tooth Tip Lands. • Drive with Multibelts of Narrow Widths Runs Quieter than Single, Wide Belt. • Slant Belt with Idler Pully Approximately 15 deg before It Contacts Wheel. • Use Barrel Shaped, Rather than Cylindrically Shaped Wheels. • Minimize Belt Tension. • Maximize Center Distance. • Minimize Belt Speed.
Headstock Drive	Belt/Sheave Noise	• True Belt Sheaves. • Cut Air Escape Grooves Around the Drive Pockets. • Balance Sheaves. • Minimize Belt Tension
Electric Motor	• Magnetic Noise • Unbalance of Rotor Assembly • Bearings • Brushes Sliding on Slip Rings • Rattling of Loose Components • Windage Noise • Rubbing of Stationary and Rotating Components	• Balance Rotor Assembly. • Bearing Replacement. • Unidirectional Fan. • Resilient Motor Mounts • Enclosure

Table 6 (continued). SUBSYSTEM/COMPONENT NOISE SOURCES AND TREATMENTS

Subsystem/ Component	Noise Source	Treatment
Mechanical Systems	Cams	• Smooth Surfaces. • Balanced Rotating Parts. • Minimize Mass and Area. • Accelerate No Faster Than System can Follow. • Try to Use Constant Acceleration.
	Gears	• Tight Tolerances and Fits. • Nonmetallic Material. • Damping Material on Gears.
	Bearings	• Journals – Thick Oil Film • Ball – Good Surface Finish • Needle – Good Surface Finish Plus Oil Film.
	Couplings	• Lubrication of Bearings • Resilient Material Around Bearings • Use Vibration Isolators – Vibration Break – Vibration Block – Damping Material

Table 6 (Continued). SUBSYSTEM/COMPONENT NOISE SOURCES AND TREATMENTS

Subsystem/ Component	Noise Source	Treatment
Hydraulic Systems	**Pump** ● General	● Two Small Pumps are Quieter than One Large Pump. ● Never Mount a Pump Rigidly on Anything that Resembles a Sounding Board or a Drum Head. ● Larger Pumps Run at Lower Pressures and Lower Speeds Produce Less Noise than Small, High Speed, High Pressure Pumps which Also Cost More. ● Fixed Displacement Pumps are Quieter than Variable Displacement Pumps - They are also Less Expensive.
	● Cavitation	● Increase Suction Pressure: - Few or Large Valves and Fittings. - Large or Short Pipes. - Elevate or Pressurize the System. - Lower the Pump.
	● Case Resonance	● Add Attenuation Material.
	● Solid Body Vibration	● Rigid Body. ● Massive Body.
	● Pressure Pulse	● Delay Discharge Port Opening. ● Controlled Backflow. ● Use Large Displacement Pump Operations at Low Speed or Discharge Pressure. Noise Is More Sensitive to Speed than to Pressure.
	Pump Motor	● Mount on Common Base to Facilitate Alignment and Isolation. ● Isolate Complete Unit with Resilient Mounts. ● Align Pump and Motor Shafts to Minimize Load on Bearings.

Table 6 (continued). SUBSYSTEM/COMPONENT NOISE SOURCES AND TREATMENTS

Subsystem/ Component	Noise Source	Treatment
Hydraulic Systems	Surges	• Add Accumulator(s). • Add Mufflers.
	Turbulence	• Increase Piping Size to Decrease Reynolds Number.
	Piping	• Avoid Sudden Changes in Direction or Section in Pipes. • Make Sure Lines Cannot Contain Air Pockets. • Use Plastic Pipes Since They are Poor Sound Conductors. • Keep Fluid Velocities Below 10 ft/sec. • Place Hydraulic Acoustic Mufflers in Line Near Pump. • Use Correct Size of Pipe and Fittings. • Use Short, Straight Pieces of Hose in Inlet, Discharge or Case Drain Line. • Keep Oil Cool • Avoid Contaminating Oil with Water. • Seal All Leaks of Ingested Air Into System: – Pipe Joints. – Pump Case. – Shaft Seals. • All Fluid Return Lines in the Storage Reservoir Should be Below Minimum Fluid Level. • Recirculating System Should Have Air Bleed.
	Valves	• Valves Mounted on Manifold Blocks Are Usually Quieter Than When They are Individually Mounted on a Large Framework. • Valves Should Work Fast But Smooth.

Table 6 (continued). SUBSYSTEM/COMPONENT NOISE SOURCES AND TREATMENTS

Subsystem/ Component	Noise Source	Treatment
Hydraulic System	Controls	● Avoid High Rates of Energy Change in Fluid. ● Design Relief Valves and Pressure Regulators for Minimum Throttling Noise. ● Minimize Use of Actuators with Rapid Changes in Energy Delivery.
	Reservoirs	● Return Line Should be Below Minimum Oil Level. ● Include Baffles. ● Elevate or Pressurize Reservoir. ● Maximize Inlet Line Size to Pump.
	Mechanical Noises	● Treat as in Motors: – Bearing Control – Balanced Rotors. – Misalignment Correction. ● Avoid Large Flexible Panels which Reradiate Noise from Other Components. ● Use Subsystem Isolation.
Pneumatic Systems	Exhaust	● Use Mufflers Which: – Use Sound Absorbing Material. – Use Acoustic Filter. – Use Diffusion at the Exhaust Exit. ● Pipe Exhaust Away From Operator's Area. ● Use Gradual Exhaust to Reduce Amplitude of Exhaust Pressure Pulse. ● Use Baffles at Discrete Locations to Prevent Standing Waves.

Table 6 (concluded). SUBSYSTEM/COMPONENT NOISE SOURCES AND TREATMENTS

Subsystem/ Component	Noise Source	Treatment
Pneumatic Systems	Exhaust	• Use An Expansion Volume to Drop Exhaust Pressure. • Minimize Exhaust Air Velocity. • Provide a Tortuous Path For Exhaust. • Use Lowest Operating Pressure That Will Provide Satisfactory Performance.

Enclosures and Barriers	Control Option	Attenuation (dBA)	Unit Cost per sq ft or Each ($)	Productivity Penalty
	Absorption	3 – 5	0.50 – 2.00	None
	Damping	3 – 10	0.20 – 4.00	None
	Barriers	5 – 15	1.00 – 3.00	Up to 15%
	"Glove Box" Booths	3 – 15	250.00 – 400.00 ea.	Up to 20%
	Machine Enclosures	5 – 50	4.00 – 8.00	Up to 25%
	Worker Shelters	4 – 20	250.00 – 3000.00 ea.	None

SECTION VI

IDENTIFICATION AND DISTRIBUTION OF EXISTING TECHNOLOGY

For the purpose of this study existing technology is defined as "the demonstrated application of scientific knowledge to reduce the noise levels of particular machines, or machine types with measureable results". Ideally, the application of scientific knowledge should be predictable and duplicatable. Unfortunately, based on a review of the articles and papers, there is little evidence that either prediction or close duplication are possible except in simple applications. Therefore, this latter constraint is not considered in the discussion of existing technology. "Treatment" is considered synonomous with "technology".

Table 7 represents a restructuring of Table 5 in that machine applications are grouped with common treatments. Note:

- The most common treatment is the use of an enclosure. This treatment was applied to 18 machine types at an average cost of $4700 and an average effectiveness of 14 dBA reduction in noise level. The effectiveness of the enclosure varied from a high of 24 dBA reduction to a low of 5 dBA reduction. Costs vary from $25,000 to $450. The $450 enclosure was associated with the 5 dBA reduction. The $25,000, enclosure yielded a 12 dBA reduction and the 24 dBA reduction cost $900.
- Damped workpiece or tool holder treatments were used on four machine types at an average level of noise reduction of 10 dBA.
- Acoustic lining on machine or transfer equipment was used on four machine types at an 11 dBA average level of noise reduction. When used on transfer equipment it is most effective when the primary noise is generated by the interactions of the workpieces with the transfer equipment rather than by piece-to-piece interactions.

- Mufflers are effectively used on both hydraulic and pneumatic equipment. They are economical, at an average cost of $25, and effective, at an average level of noise reduction of 10 dBA.
- Component treatments such as speed reduction, control of bearings, cam and gear control, isolation of equipment, etc., are usually combined to achieve meaningful levels of noise reduction.
- Process substitution is, at times, a viable noise reduction treatment.
- In general, the use of enclosures has been more effective in noise reduction of existing machinery than any of the other treatments except process substitution. There appear to be two reasons for this: the enclosure is the easiest treatment to use since it can be made effective with a minimum knowledge of acoustical engineering; and noise reduction of machines is best implemented in the design stage so that rework of existing machines to lower noise standards is of limited effectiveness.

Table 6 illustrates the distribution of the demonstrated technology over the machine types as cataloged by the American Machinist (Reference 3). An inspection of the table illustrates:

- Enclosures were applied to 12 of the 34 machine types. Except in isolated cases it is reasonable that this form of treatment could be applied across the entire range of machine types. Deleterious effects indicated in the literature included some decrease in productivity (depending on the machine and the enclosure) and a potential increase in the ambient environmental temperature around the machine. Both of these effects, however can be minimized by judicious design practices.
- Damping of the workpiece or tool holder was applied to three of the 34 machine types. This treatment could be extended to other machines with significant tool vibrational characteristics such as boring machines, saws, presses and forging machines. If properly applied this type of treatment could result in less tool chatter and increased tool life, feeds and speeds with the resultant increase in productivity (Reference 2). In some cases, however, setup time may be increased to the detriment of productivity.
- Acoustic lining on machine or transfer equipment was used on four of the 34 machine types. There is no apparent decrease in productivity from this treatment (except for wear life) and it should be transferable to any machine type which has automated or semiautomated transfer equipment.

- Mufflers were used on four of the machine types with no apparent change in productivity. This treatment should be applicable to any pneumatic discharge and to high pressure or high velocity hydraulic systems.
- Reduced speed of equipment was used on one machine type (i.e. boring machine). In this case the hydraulic pump and motor speeds were reduced in conjunction with several other treatments. No deleterious effects were noted (Reference 3). It can generally be expected, however, that reduced speeds will result in lower noise levels accompanied by reduced productivity. The correspondence between speed and noise level is not necessarily one-to-one however, and at times significant noise reductions can be achieved with less significant losses in productivity.
- Control of bearings was used on one machine type. This treatment can, no doubt be extended to every machine type with no loss of productivity.
- Similarly, cam and gear control was indicated on one machine type. This also is a near universally applicable treatment. The use of plastic gears, however, requires special design and application considerations.
- Process substitution was indicated on three machine types. No productivity data, however was available. This "treatment" could have significant noise reduction potential either at the direct machine substitution level or at the machine design stage (see Section VIII for further discussion).
- Isolation of subassemblies was indicated on one machine type but this treatment is readily applicable to virtually every machine type. No loss in productivity should be expected for this treatment.
- Increasing the number of steps was used as a treatment on mechanical presses. Although no data on productivity changes was given (Reference 3) it does not necessarily follow that the same productivity cannot be maintained. This philosophy can be extended to automatic cutting machines where unused cutting stations are available.

If the machine types are structured into generic subassemblies (References 4 and 5) Table 9 can be contructed. Open blocks represent subassemblies associated with each machine type. Noise treatments, other than enclosures, are distributed onto this matrix and are represented by □ in the appropriate subassembly/machine type element. Based on this table, note:

- Noise treatments are identified in 16 of the 241 elements,
- Six noise treatment elements are identified as pertinent to drives,
- Cutter treatments are identified for turning and milling machines,
- Transfer equipment is treated on four machine types, and
- The cutting or fabricating process has been treated on three machine types.

Table 10 represents a distribution of the specific noise treatments over the major subassemblies - the specific machine types are not considered in this table. Note that:

- Twelve of the noise reduction treatments relate primarily to reducing the drive noise.
- One treatment related to the "frame".
- Two treatments, damped workpiece and tool holder are applicable to cutters, dies and the cutting or fabricating process.
- Dies had four treatments and the transfer equipment had six treatments identified.
- Sixteen of the 22 subassemblies did not have any noise treatments indicated.
- In general, those subassemblies which received some noise reduction treatment can be identified as noise sources. However, some subassemblies, such as tools, blade assemblies, wheels, etc., which are known noise sources have not been treated.

Table 7. APPLICABILITY, COST AND EFFECTIVENESS OF NOISE REDUCTION TREATMENTS

Treatment	Applications	Average Cost of Treatment ($)	Average Effectiveness of Treatments (dBA)
Enclosure	• Cut-off Saw • Automatic Screw Machine • Hand Held Grinders • Shaper • Perforator • Blanking Press • Cold Header • Staple Forming Machine • Swager • Screwplate Press • Power Press • Pin Machine • Automatic Spot Welding Machine • Metalizing Machine • Twisting Machine • Air Hammers • Deburring Machine • Tumbling Barrel	4,700	14
Damped Workpiece or Tool Holder	• Milling Machine • Vertical Turret Lathe • Automatic Screw Machine • Punch Press		10
Acoustic Lining on Machine or Transfer Equipment	• Hydraulic Press (Chute) • Shears (Rollers) • Upset Forging Press (Pump & Lines) • Tumbling Barrel (Barrel)		11

Table 7 (continued). APPLICABILITY, COST AND EFFECTIVENESS OF NOISE REDUCTION TREATMENTS

Treatment	Applications	Average Cost of Treatment ($)	Average Effectiveness of Treatments (dBA)
Muffler	• Vertical Turret Lathe (Hydraulic Acoustic Filter) • Pneumatic Grinding Machine (Muffled Exhaust) • Pneumatic Shear (Muffled Exhaust) • Forging Machine (Relocated Blower to Outside)	25	10
Reduced Speed of Equipment	• Horizontal Boring Machine (Pump and Motor)		
Control of Bearings	• Horizontal Boring Machine (Honed Roller Bearings) • Cablemaking Machine		
Cams and Gear Control	• Herd Spinner (New Cams) • Wire Drawing Machine (Plastic/Steel Gear Mix)		2
Miscellaneous	• Horizontal Boring Machine (Isolated Motor, Pump & Fittings) • Punch Press (Increase Number of Steps) • Wire Drawing Machine (Change from Cog Belts to V-Belts) • Wire and Cable Insulating Machine (Revised Air Wiper Seals)		10

Table 1 (concluded). APPLICABILITY, COST AND EFFECTIVENESS OF NOISE REDUCTION TREATMENTS

Treatment	Applications	Average Cost of Treatment ($)	Average Effectiveness of Treatments (dBA)
Process Substitution	• Weld Grinder Replaced with Belt Sander	1,200	12
	• Plate Grinder Replaced with Planer	15,000	23
	• Punch Press – Substitute Air Ejection by Mechanical Ejection		
	• Riveting Replaced with Welding		
	• Chipping Hammers Replaced with Acetylene Torches		20

[illegible]

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Turning Machines	●	●		●						
Boring Machines					●	●			●	
Drilling Machines										
Milling Machines		●								
Multifunction Machines										
Transfer Machines										
Automatic Assembly Machines										
Tapping Machines										
Threading Machines										
Broaching Machines	●									
Planing Machines										
Shaping Machines	●									
Contour Sawing and Filing Machines										
Cutoff and Sawing Machines	●									
Grinding Machines	●			●				●		
Honing Machines										
Lapping Machines										
Polishing and Buffing Machines										
Gear Cutting and Finishing Machines										
Electric Machining Units										
[illegible] and Testing Machines										
Hydraulic and Pneumatic Presses	●		●							
Mechanical Presses	●	●						●		●
Punching and Shearing Machines	●		●	●						
Forging Machines	●		●	●						
Wire and Ribbon Formers	●						●			
Riveting Machines								●		
Electric Arcwelding Equipment	●									
Electric Resistance Welding Equipment										
Brazing Machines										
Flame Cutting Machines										
Plastic Molding Machines										
Upsetting Machines										
Cleaning and Finishing Equipment	●		●							

Reproduced from best available copy.

Turning Machines
Boring Machines
Drilling Machines
Milling Machines
Multifunction Machines
Transfer Machines
Automatic Assembly Machines
Tapping Machines
Threading Machines
Broaching Machines
Planing Machines
Shaping Machines
Contour Sawing and Filing Machines
Cutoff and Sawing Machines
Slotting Machines
Honing Machines
Lapping Machines
Polishing and Buffing Machines
Gear Cutting and Finishing Machines
Electrical Machining Units
Bending and Forming Machines
Hydraulic and Pneumatic Presses
Mechanical Presses
Punching and Shearing Machines
Forging Machines
Wire and Ribbon Formers
Riveting Machines
Electric Arc Welding Equipment
Electric Resistance Welding Equipment
Brazing Machines
Flame Cutting Machines
Plastic Molding Machines
Die-casting Machines

Table [illegible]. [illegible]

[illegible]	[illegible] Hydraulic Filter	Reduced Pump and Motor Speed	Isolated Motor, Pump and Fittings	[illegible] Bearings	Muffled Air Exhaust	[illegible] Fans	Blower Moved to Outside Location	Pump and Lines Covered with Damping Material	Changed from Cog Belts to V-Belts	[illegible] Plastic Gears in Gear Train	[illegible] Setting Type	Closer Tolerances in Gearing	[illegible] Barrel with Rubber	[illegible] Workplate	Damped Tool Holder	Increased Number of Steps	Add Cushioning under Die Block	[illegible] Tube Inserts	Damping Material on Outside of Parts Handling Chutes	Cover and Fill Pallets with Damping Material	Substitute Mechanical for Air Parts Ejection	Revised Wiper Seals
[illegible]	●	●	●	●	●	●	●	●	●	●	●	●										
[illegible]													●									
[illegible]																						
[illegible]																						
[illegible]																						
[illegible]																						
[illegible]																						
[illegible]																						
[illegible]																						
[illegible]														●	●							
[illegible]																						
[illegible]																						
[illegible]																						
[illegible]																						
[illegible]																						
[illegible]																						
[illegible]														●	●	●	●					
[illegible]																		●	●	●	●	●
[illegible]																						
[illegible]																						
[illegible]																						
[illegible]														●	●	●	●					

Reproduced from
best available copy.

SECTION VII

POTENTIAL OF TRANSFERRING TECHNOLOGY FROM FEDERALLY FUNDED PROGRAM

In order to gain some insight into the potential of transferring noise technology from Federal programs to industry three of the noise A, B, and D panel reports (References 6, 7 and 8) were reviewed. Table II is a compilation of the types of technology which may potentially be transferred into the industrial sector. In particular the table lists the Federal agency, the area of noise related research being conducted by the agency, the type of research, potential application of this research in the industrial sector and the source of the data. Based on this table, note:

- Aircraft noise reduction technology could be applied in the industrial areas of: damping and absorbing materials; fan noise reduction; and vibration isolation. The potential of applying the associated technology is still in the future since the technology base is at the basic research level.
- Surface vehicle noise reduction technology could be applied in the industrial areas of: general applications to machinery noise; transfer equipment noise reduction; hydraulic systems; enclosure design; machine tool noise; and muffler noise. Since the technology base of these programs is at the development level the transfer of technology should be available in the near future.
- Machinery noise reduction technology could be applied in the areas of: basic application to machinery noise; hydraulic equipment; electric motors; drive systems; transfer equipment; pneumatic equipment; and punch presses.

- The primary Federal agencies with applicable noise control technology are: DOD, DOT, NSF, DOI and NIOSH (HEW). In all probability certain aspects of other Federal agencies' programs can be applied in some form to machinery noise reduction. The areas listed in the table, however, appeared to be the most directly applicable.

Table 12 illustrates the potential distribution of Federally developed noise reduction technology over the machinery subsystems. From this table it is evident that a significant technology transfer potential exists since potential applications have been identified for 20 of the 22 subassemblies. An assessment of the real worth of this technology transfer, however, requires a detailed review of the appropriate Federal programs.

Table 11. POTENTIAL OF TRANSFERRING ADVANCE NOISE REDUCTION TECHNOLOGY FROM FEDERAL PROGRAMS TO INDUSTRY

Federal Agency	Area of Research	Type of Research	Potential Application	Data Source
DOT/NASA	Acoustic Material Research	Basic Research	Damping of Panels and Materials for Enclosures	EPA-600/2-75-003 A/C Noise Panel Report
DOD/NAVY	Duct Acoustics and Suppression	Basic Research	Damping of Panels and Materials for Enclosures	EPA-600/2-75-003 A/C Noise Panel Report
DOD/AF	Propeller Noise	Basic Research	Fan Noise	EPA-600/2-75-003 A/C Noise Panel Report
DOD/AF	Structural Response to Noise	Basic Research	Vibration Isolation	EPA-600/2-75-003 A/C Noise Panel Report
DOT	Basic Engine Noise Reduction	Development	Basic Application to Machinery Noise	EPA-600/2-75-002 Surface Vehicle Panel Report
DOD/A	Modelling of a Combat Vehicle Track	Development	Transfer Equipment Noise Reduction	EPA-600/2-75-002 Surface Vehicle Panel Report
DOD/A	Pump Noise Definition	Development	Hydraulic Equipment	EPA-600/2-75-002 Surface Vehicle Panel Report
NSF	Vehicle and Machinery Noise Control and Acoustics	Development	• Enclosure Design • Machine Tool Noise • Muffler Noise	EPA-600/2-75-002 Surface Vehicle Panel Report

Table II (continued). POTENTIAL OF TRANSFERRING ADVANCE NOISE REDUCTION TECHNOLOGY FROM FEDERAL PROGRAMS TO INDUSTRY

Federal Agency	Area of Research	Type of Research	Potential Application	Data Source
DOD/N	Diesel Engine Noise Reduction	Development	Basic Application to Machinery Noise	EPA-600/2-75-xxx Machinery Noise Panel Report
DOD/N	Hydraulic Systems Noise Reduction	Development	Hydraulic Equipment	EPA-600/2-75-xxx Machinery Noise Panel Report
DOD/N	Rotating Electrical Equipment Noise Reduction	Development	Electric Motors	EPA-600/2-75-xxx Machinery Noise Panel Report
DOD/N	Gear Noise Reduction	Development	Drive Systems	EPA-600/2-75-xxx Machinery Noise Panel Report
NSF	Impact Mechanics and the Generation of Impulsive Noise	Basic Research	Impact Machinery	EPA-600/2-75-xxx Machinery Noise Panel Report
NSF	Sound Generation and Propagation in Internal Flows	Basic Research	Hydraulic and Pneumatic Systems	EPA-600/2-75-xxx Machinery Noise Panel Report
NSF	Mechanical Diesel Engine Noise	Basic Research	Basic Application to Machinery Noise	EPA-600/2-75-xxx Machinery Noise Panel Report
DOI/BM	Alternate Conveyor Designs for Mine Machinery	Demonstration	Transfer Equipment	EPA-600/2-75-xxx Machinery Noise Panel Report

Table 11 (concluded). POTENTIAL OF TRANSFERRING ADVANCE NOISE REDUCTION TECHNOLOGY FROM FEDERAL PROGRAMS TO INDUSTRY

Federal Agency	Area of Research	Type of Research	Potential Application	Data Source
DOI/BM	Noise Control in Surface Mining Facilities: Chutes and Screens	Demonstration	Transfer Equipment	EPA-600/2-75-xxx Machinery Noise Panel Report
NIOSH	Punch Press Noise Reduction	Development	Punch Presses	EPA-600/2-75-xxx Machinery Noise Panel Report

Table [illegible]

[illegible]	Acoustic Material Research	Duct Acoustics and [illegible]	Propeller Noise	Structural Response to Noise	Small Engine Noise Reduction	Modeling of a Combat Vehicle Track	[illegible] Noise Definition	Vehicle and Machinery Noise Control and Acoustics	Diesel Engine Noise Reduction	Hydraulic Systems Noise Reduction	Rotating Electrical Equipment Noise Reduction	Gear Noise Reduction	Blast Mechanics and Impulsive Noise Generation	Sound Generation and Propagation in Internal Flows	Mechanical Diesel Engine Noise	Alternate Conveyor Designs for Mining Machinery	Noise Control in Surface Mining Facilities, Chutes and Screens	Punch Press Noise Reduction
[illegible]			●	●	●		●	●	●	●	●	●	●	●	●			●
[illegible]		●		●	●			●					●		●			●
[illegible]					●							●			●			
[illegible]					●							●			●			
[illegible]					●							●			●			
[illegible]					●							●			●			
[illegible]					●							●			●			
[illegible]					●							●			●			
[illegible]					●							●			●			
[illegible]								●										
[illegible]								●										
[illegible]								●										
[illegible]								●										
[illegible]																		
[illegible]													●					●
[illegible]													●					●
[illegible]													●					●
[illegible]		●		●	●	●		●	●			●	●		●	●	●	●
[illegible]					●				●			●			●			
[illegible]	●	●		●	●			●	●				●		●			●
[illegible]																		
[illegible]								●					●					●

SECTION VIII

TECHNOLOGY NEEDED

THE UNDERLYING PROBLEM

Very little information is evident on the basic mechanism of noise generation and reduction. Papers and articles describe the isolation of noise sources, noise treatments and effectiveness of the treatments. Relatively few are well enough documented to allow the duplication of the treatment. Virtually none allows a quantifiable extension of the treatment to other machines or subsystems. The technology of noise control needs to be brought out of the realm of an art into that of a science.

It is generally acknowledged that a theoretical noise analysis of a machine or a subassembly is beyond the current state-of-the-art except for relatively simple mechanisms. The approach to an improved understanding of noise control must, therefore, follow an empirical methodology which, in turn, leads to cause and effect relationships which can be quantified, applied and extended. In turn, these relationships can be examined in order to generate a meaningful theoretical understanding of the noise generation and control mechanism.

Recommended areas of technological growth are structured to: provide a logical basis for establishing the need for applied noise control research; machinery related areas in which noise control technology is needed; and subsystem related areas needing technology.

BASIS FOR ESTABLISHING THE NEED AND PRIORITY OF APPLIED RESEARCH

As indicated in Table 8 approximately 12 percent of the machine types listed have had some form of noise treatment applied, other than enclosures. From Table 10 it was evident that this treatment was extended over few of the subassemblies. The first recommendation, then, is to conduct a complete survey of noise levels (dBA) by machine type and identify and quantifies the noise output (dB and frequency) of the major subassemblies. The results of this survey, coupled with the number of workers exposed to each machine type will form the basis for establishing the need and the priorities for noise control research.

MACHINE RELATED AREAS IN WHICH NOISE CONTROL TECHNOLOGY IS NEEDED

Based on the reports and articles surveyed it is indicated that noise control treatments are being applied either grossly, in the form of enclosures, or randomly, in the form of treating a particular noise source(s) on a particular machine. In some instances process substitutions are made, however, these substitutions are in the form of replacing a noisy machine with a less noisy machine which performs a similar function in a different manner.

It is also recognized that machines have evolved over the years through the implementation of refinements which were primarily structured to increase the productivity of the machines. The fundamental mechanisms of the machines, however, have been kept virtually intact so that one could easily recognize the basic family relationship of a lathe circa 1775 and a lathe circa 1975. Except in isolated instances, such as orbital forging, little has been done to examine the basic functions of the noisy machinery in order to substitue less noisy functional mechanisms.

Reproduced from best available copy.

An area of needed noise control technology, therefore, is a systematic investigation of the functions of each production and nonproduction, metal cutting and metal forming machine type. Existing and alternate functions should be investigated in terms of noise, efficiency and alternative methods of performing the job. It is probable that similar functions will be identifiable across a range of machine types and that noise and efficiency treatments will have an equal range of applicability.

SUBSYSTEM RELATED AREAS NEEDING TECHNOLOGY

Subsystem related areas in which technological advances are needed:

- Drives
  General: Quantified noise reduction cause and effect relationships for mechanical, electrical, hydraulic and pneumatic components and subsystems; explore the noise/power efficiency relationships between and within the available hydraulic, pneumatic, electrical and mechanical drives; and develop the relationships which will allow the design and selection of quiet subsystems to particular noise levels.
  Hydraulic: Develop quiet pump, motor, valve and control technology.
  Pneumatic: Develop quiet muffler, compressor and nozzle technology.
  Electrical: Develop quiet motor technology.
  Mechanical: Develop quiet gear, cam, linkage, bearing and coupling technology.
- Cutting Tools: A fundamental investigation of cutting tool noise generation in terms of: the basic mechanism of metal removal; and the relationship between the metal cutting process and the material being cut.
- Dies: A fundamental investigation of the metal forming process in terms of material, forming and noise relationships.
- Transfer Equipment: Damping material development with emphasis on damping effectiveness and wear life.
- Cutting or Fabricating Process: See cutting tools and dies.
- Materials: A fundamental understanding of absorption and damping materials in terms of the material properties with respect to sound pressure or energy reduction at particular frequencies.

SECTION X

REFERENCES

1. Bergmann, E. P., Fieldhouse, I. B., "Abstracts of the 1971-1973 U. S. and Foreign Open Literature on Noise", EPA Task Report on on Contract 68-01-2234, April 1974.
2. Machinery noise data sheets, appendix.
3. The 11th American Machinist Inventory of Metalworking Equipment 1973, American Machinist, October 29, 1973.
4. S. E. Rusinoff, "Manufacturing Processes - Materials", American Technical Society, Chicago, 1949.
5. S. E. Rusinoff, "Manufacturing Processes - Production", American Technical Society, Chicago, 1953.
6. EPA-600/2-75-003, "Federal Aircraft Noise Research, Development, and Demonstration Programs: FY73-FY75", March 1975.
7. EPA-600/2-75-002, "Federal Surface Vehicles Noise Research, Development, and Demonstration Programs: FY73-FY75", March 1975.
8. EPA-600/2-75-xxx, "Federal Machinery Noise Research, Development, and Demonstration Programs: FY73-FY75", 1975

APPENDIX: DATA SHEETS

Preceding page blank

APPENDIX

MACHINERY NOISE DATA SHEETS

MACHINERY NOISE DATA SHEET

Industry: Food and Kindred Products SIC: 20

Machine/Area: Bodymaker

Noise Level before Treatment: 106 dbA

Noise Level after Treatment: 90 dbA

Cost of Treatment: $ 5500/Unit

Treatment and Technology Used: Enclosure, Fiberglass Body, Lined with Leadbacked Acoustical Foam

- Materials: See above
- Design Practices: Unknown
- Analysis Techniques: Unknown

Deleterious Effects of Treatment: Excessive Heat Buildup, No Effect on Productivity.

Measurement Techniques Used: Unknown

Sponsor of Work: Industrial

Comments:

Source: OSHA File 31.1

MACHINERY NOISE DATA SHEET

Industry: Food and Kindred Products **SIC:** 20

Machine/Area: Bottling Line Operation

Noise Level before Treatment: 94-100 **dbA**

Noise Level after Treatment: Unknown **dbA**

Cost of Treatment: $ Unknown

Treatment and Technology Used: Enclosure, Absorption

- **Materials:** Unknown
- **Design Practices:** Narrow High Velocity Track
- **Analysis Techniques:** Intermitting Bottle Impact Frequency

Deleterious Effects of Treatment: Unknown

Measurement Techniques Used: Unknown

Sponsor of Work: Industrial

Comments: Noise Sources: Depalletizing Actual Processing Plant
(Process) Decrating Bottle Conveying System
Repalletizing

Source: [illegible], T. H. and [illegible], R. D., "Noise Generation and Prediction in Automated Bottling Line," Noise Control Engr., 1 (2), 1973.

MACHINERY NOISE DATA SHEET

Industry: Food and Kindred Products SIC: 20

Machine/Area: Assembly Line

Noise Level before Treatment: 97-101 dbA

Noise Level after Treatment: Unknown dbA

Cost of Treatment: $ Unknown

Treatment and Technology Used: Engineering Studies Underway.

- Materials: Unknown
- Design Practices: Identify Problems, Make Changes, Evaluate Effectiveness, Prototype, Production.
- Analysis Techniques: Unknown

Deleterious Effects of Treatment: Unknown

Measurement Techniques Used: Unknown

Sponsor of Work: Industrial

Comments:

Source: OSHA File 311

MACHINERY NOISE DATA SHEET

Industry: Food and Kindred Products SIC: 20

Machine/Area: Automatic Can Fabrication Machine

Noise Level before Treatment: 93-102 dbA

Noise Level after Treatment: 90 dbA

Cost of Treatment: $ Unknown

Treatment and Technology Used: Acoustical Enclosures, Mufflers, Acoustical Coatings, Shock Absorbers, Redesign of Equipment.

- Materials: Unknown
- Design Practices: Unknown
- Analysis Techniques: Unknown

Deleterious Effects of Treatment: Unknown

Measurement Techniques Used: Unknown

Sponsor of Work: Industrial

Comments:

Source: OSHA File 806 & 796

MACHINERY NOISE DATA SHEET

Industry: Apparel and Related Products SIC: 23

Machine/Area: Tack Driver

Noise Level before Treatment: 116 dbA

Noise Level after Treatment: 96 dbA

Cost of Treatment: $

Treatment and Technology Used: Reduced Spring Energy, Redesigned Lever, Oil Cushion Buffer, Rubber Bushings

- Materials:
- Design Practices: An Experimental/Functional/Design Analysis was Used to Identify Noise Sources, Suggest Solutions and Verify the Treatment.
- Analysis Techniques: Functional Dynamic Analysis and Experiments

Deleterious Effects of Treatment: None Apparent

Measurement Techniques Used: Spectrum Analysis

Sponsor of Work: Unknown (Possibly University)

Comments: A Good Discussion of An Empirical Approach to Noise Abatement Treatment

Source: Rattur, et al, Reduction of Impact Noise at the Design Stage: A Specific Case Study, The Inst of Mech Engr, C 196, 26/73

MACHINERY NOISE DATA SHEET

Industry: Lumber and Wood Products SIC: 24

Machine/Area: Molding & Millworking Floor

Noise Level before Treatment: Unknown dbA

Noise Level after Treatment: Unknown dbA

Cost of Treatment: $ 1000 (Enclosure)

Treatment and Technology Used: Enclosure (10dB) Baffles (few dB)

- Materials: Unknown
- Design Practices: Unknown
- Analysis Techniques: Unknown

Deleterious Effects of Treatment: Unknown

Measurement Techniques Used: Unknown

Sponsor of Work: Industrial

Comments:

Source: Witt's, R. "The ABC's of Noise Control"
Job Safety and Health, v 3, 1975

MACHINERY NOISE DATA SHEET

Industry: Lumber and Wood Products SIC: 24

Machine/Area: Wood Chipping Factory

Noise Level before Treatment: Unknown dBA

Noise Level after Treatment: Unknown dBA

Cost of Treatment: $ Unknown

Treatment and Technology Recommended: (1) Underground Operation of Chipper; (2) Semiunderground Operation of the Drum Barker

- Materials: Unknown
- Design Practices: Unknown
- Analysis Techniques: Unknown

Deleterious Effects of Treatment: Unknown

Measurement Techniques Used: Unknown

Sponsor of Work: Unknown

Comments:

Source: Baba, H., "Noise Problems and Protection at Chip Factory", Wood Industry, V 27 n 10, 1972 (Japanese)

MACHINERY NOISE DATA SHEET

Industry: Lumber and Wood Products SIC: 24

Machine/Area: Saws and Jointer

Noise Level before Treatment: Unknown dbA

Noise Level after Treatment: Unknown dbA

Cost of Treatment: $ 1000/Enclosure

Treatment and Technology Used: (1) Enclose Gang Ripper; (2) Baffles Hung over Cutoff Saw; (3) Enclose Finger Jointer; (4) Personal Ear Plug against Other Cutting Equipment.

- Materials: Unknown
- Design Practices: Unknown
- Analysis Technique: Unknown

Deleterious Effects of Treatment: None

Measurement Techniques Used: Unknown

Sponsor of Work: Industrial

Comments:

Source: Yitts, R., "The ABC's of Noise Control", Job Safety and Health, v 2 n 11, 1974

MACHINERY NOISE DATA SHEET

Industry: Lumber and Wood Products SIC: 24

Machine/Area: Radial Arm Saw

Noise Level before Treatment: 115 dbA

Noise Level after Treatment: 80 dbA

Cost of Treatment: $ 170/Unit

Treatment and Technology Used: Used 134 Tooth Blade and Reduced Air Pressure From 100 psig to 13 psig.

- Materials:
- Design Practices: Shop Rework
- Analysis Techniques: Unknown

Deleterious Effects of Treatment: None

Measurement Technique Used: Unknown

Sponsor of Work: Industrial

Comments:

Source: OSHA File [illegible]

MACHINERY NOISE DATA SHEET

Industry: Lumber and Wood Products SIC: 24

Machine/Area: Chain Saw

Noise Level before Treatment: Unknown dbA

Noise Level after Treatment: Unknown dbA

Cost of Treatment: $ Unknown

Treatment and Technology Used: Muffler

- Materials:
- Design Practices:
- Analysis Techniques:

Deleterious Effects of Treatment:

Measurement Techniques Used: In Anechoic Chamber

Sponsor of Work: Industrial

Noise Sources (1) Exhaust (5) Piston slap
(2) Intake (6) Fan
(3) Cutting (7) Bearing
(4) Structural Primary Source is Exhaust

Source: [illegible], V. & Metcalf, R. N. "Noise Reduction of Chain Saws" Proceedings of the short courses, Purdue Uni., Ju., 197[illegible]

MACHINERY NOISE DATA SHEET

Industry: Paper and Allied Products SIC: 26

Machine/Area: Paper Converting Machinery

Noise Level before Treatment: ________ dbA

Noise Level after Treatment: ________ dbA

Cost of Treatment: $________

Treatment and Technology Used: (1) Polyurethane Foam Filling into Cylinder (3-6dB.) (2) Polyfibron on Wideband Gear (4dB.)

- Materials:
- Design Practices:
- Analysis Techniques:

Deleterious Effects of Treatment:

Measurement Techniques Used: (1) Microphone (2) Isolation of Individual Noise Sources

Sponsor of Work: Industrial

Comments:

Source: Schurr, R. C. et al., "Noise Reduction Techniques for Paper Converting Machinery", Tappi, v 56 n 6, 1973

MACHINERY NOISE DATA SHEET

Industry: Printing and Allied Products SIC: 27

Machine/Area: Folding Machine

Noise Level before Treatment: 91 dbA

Noise Level after Treatment: 82 dbA

Cost of Treatment: $ Unknown

Treatment and Technology Used: Acoustical Sound Guard Installed Above Machine

- Materials: Unknown
- Design Practices:
- Analysis Techniques:

Deleterious Effects of Treatment: None

Measurement Techniques Used: Unknown

Sponsor of Work: Industrial

Comments:

Source: OSHA File 923

MACHINERY NOISE DATA SHEET

Industry: Chemical and Allied Products SIC: 28

Machine/Area: Valve

Noise Level before Treatment: ______ dbA

Noise Level after Treatment: ______ dbA

Cost of Treatment: $______

Treatment and Technology Used:

- Materials:
- Design Practices: (1) Cage-style Trim for Globe Valves, Diametrically Opposed Flow Holes in the Wall of the Cage. (2) Ball Valves as an Anticavitation Device and Others (See Next Page)

Deleterious Effects of Treatment:

Measurement Techniques Used:

Sponsor of Work: Industrial

Noise Source: Vapor Bubbles at Vena Contracta - Implosion of Bubble + Shock Wave Hammer Against Valve Outlet and Piping

Comments: Summary of Valve Noise Elimination Techniques.

Source: French, A. L. & Reams, L. B. "How to Control Valve Noise and Wear Due to Cavitation" Pulp and Paper, Oct. 1973

Technique	Effectiveness	Economic Aspects
Hardened trim parts, sacrificial piping, etc.	Provides no noise attenuation, must rely on path treatment	Frequent need for replacement parts, very expensive
Valves in series	Dependent upon service conditions, can eliminate cavitation and noise with no additional treatment	Large capital investment, high costs for designing and installing piping, may not be practical
Acoustical insulation, heavy-walled piping	Up to 10 dB attenuation by insulation per one inch of thickness	Economical, although cavitation damage may still result
Cage-style trim for cavitation control	Controls cavitation up to 1500 psi (pounds per square inch) and some noise attenuation	More economical than valves in series or valve trim designed to prevent cavitation
Valve trim to prevent cavitation by staging pressure drop	Effective at most pressure drops, limited in capacity and restricted to use on clean liquids	High initial cost, most economical when pressure drop exceeds 1500 psi and capacity requirements are not extreme

MACHINERY NOISE DATA SHEET

Industry: Chemical and Allied Products SIC: 28

Machine/Area: Control Valve

Noise Level before Treatment: ? dbA

Noise Level after Treatment: ? dbA

Cost of Treatment: $?

Treatment and Technology Used: (1) Increase Pipe Wall Thickness Downstream; (2) Use of Noise Reducing Expansion Plates Downstream of Valve; (3) Acoustical Insulation Downstream; (4) Reduce Throttle Velocity

- Materials:
- Design Practices:
- Analysis Techniques:

Deleterious Effects of Treatment:

Measurement Techniques Used:

Sponsor of Work: Industrial

Comments:

Source: Baumann, H. D. "Control Valve Noise Cause and Cure", Chemical Engineering, May 1971.

MACHINERY NOISE DATA SHEET

Industry: Chemical and Allied Products SIC: 28

Machine/Area: Automatic Control Valves

Noise Level before Treatment: ________ dbA

Noise Level after Treatment: ________ dbA

Cost of Treatment: $________

Treatment and Technology Used: Silencer and Enclosures; Heavy Wall Piping; Insulation of Exposed Metal Boundary of Fluid Stream.

- Materials: ________
- Design Practices: ________
- Analysis Techniques: ________

Deleterious Effects of Treatment: ________

Measurement Techniques Used: ________

Sponsor of Work: Industrial

Noise Source: High Speed Fluid Steam Velocity
(1) Mech. Vibration of Valve Components
(2) Hydrodynamic Flow
(3) Aerodynamic Flow

Source: Gillen, J. F. "Identification Prediction and Attenuation of Control Valve Noise" Proceedings of Short Courses, Purdue Univ., May 1975

MACHINERY NOISE DATA SHEET

Industry: Chemical and Allied Products SIC: 28

Machine/Area: Pump

Noise Level Before Treatment: 91-94 dbA

Noise Level After Treatment: 71 dbA

Cost of Treatment: $

Treatment and Technology Used: (1) Cast Iron Bell and Plastic Fan for an Electric Motor (4-6dB;) (2) Isolation Mounting for Elec. Motor (2-3dB;) (3) Less Powerful Pump. (4) Totally Enclosed Fan Cooled Elec. Motor.

- Materials:
- Design Practices:
- Analysis Techniques:

Deleterious Effects of Treatment:

Measurement Techniques Used:

Sponsor of Work: Industrial

Comments:

Source: Price, J. R., "Minimizing Noise in Hydraulic Power Units" Hydraulics and Pneumatics, May 1973

MACHINERY NOISE DATA SHEET

Industry: Petroleum and Coal Products SIC: 29

Machine/Area: Gas Handling

Noise Level before Treatment: ______ dbA

Noise Level after Treatment: ______ dbA

Cost of Treatment: $______

Treatment and Technology Used: Basic Elements of Noise Control

(1) Vibr Isolation (Balancing & Alignment) (4) Damping (Resonance)
(2) Transmission Loss (Passive Barrier) (5) Seals & Fastener
(3) Absorption (6) Silencer

- Materials:
- Design Practices:
- Analysis Techniques:

Deleterious Effects of Treatment:

Measurement Techniques Used:

Sponsor of Work: Industrial

Comments: General Discussion of Methodology

Source: Dear, T. "Large Gas Handling Plants in Noise Control"
Chemical Engineering Progress, v 70 n 2, 1974

MACHINERY NOISE DATA SHEET

Industry: Petroleum and Coal Products SIC: 29

Machine/Area: Pneumatic Drill

Noise Level before Treatment: Unknown dbA

Noise Level after Treatment: Unknown dbA

Cost of Treatment: $ Unknown

Treatment and Technology Used: Mufflers

- Materials: Unknown
- Design Practices: Unknown
- Analysis Techniques: Unknown

Deleterious Effects of Treatment: Unknown

Measurement Techniques Used: Unknown

Sponsor of Work: Bureau of Mines

Comments:

Source: OSHA Files 31

MACHINERY NOISE DATA SHEET

Industry: Petroleum and Coal Products SIC: 29

Machine/Area: Electromechanical Vibrator

Noise Level before Treatment: 93 dbA

Noise Level after Treatment: 80 dbA

Cost of Treatment: $

Treatment and Technology Used: Isolated Airborne Sound From Structural Vibration. Enclosure - 1x2 Welded Angle Iron Frame. Polyurethane Foam Gasket Between Frame and Panel. 1/8 inch Lead Sheet Panels. 1/2 in Glass Fiberboard.

- Materials: See Above
- Design Practices:
- Analysis Techniques: Isolation of Effects

Deleterious Effects of Treatment: Unknown

Measurement Techniques Used: Spectrum Analysis

Sponsor of Work: Industrial

Comments:

Source: NOISEXPO, National Noise and Vibration Control Conference, September 11-13, 1973, pp 118-119.

MACHINERY NOISE DATA SHEET

Industry: Coal Industry SIC: 12

Machine/Area: Coal Cleaning Plant

Noise Level before Treatment: ________ dbA

Noise Level after Treatment: ________ dbA

Cost of Treatment: $________

Treatment and Technology Used: ________

- Materials: ________
- Design Practices: ________
- Analysis Techniques: ________

Deleterious Effects of Treatment: ________

Measurement Techniques Used: ________

Sponsor of Work: Bureau of Mines

Noise Sources: Impact, Fluid Flow, Structural Vibration.

Comments: Presentation of Noise Problem in Coal Cleaning and Various Alternatives to Prevent It (See Reverse for Cost Estimate)

Source: Unger, E. E. & [illegible], "Coal Cleaning Plant Noise and Its Control" BBN [illegible], Bureau of Mines [illegible]

Equipment	Noise Reduction Means	Unit Cost (dollars)
Screens	Rubber decking	$1300
	Slow shaking mechanism	300
	Better gearing for shaking mechanism	300
	Enclosure for shaking mechanism	200
	Improved supports	300
	Screen Enclosure	8000
Chutes	Interior ledges	100
	Rubber linings	100
	Concrete liners	100
	Exterior damping	200
Hoppers, bin	Rubber linings	300
	Exterior mass	500
Crushers	Better gearing	300
	Enclosure	7000
Car shake-outs	Replace with rotary dump	150,000
	Operator enclosures	15,000
Picking tables	Replace with rotary breaker	70,000
	Partial enclosures for workers	1500
Blowers, fans, valves	Mufflers on intakes	500
	Duct to plant exterior	500
	Enclose casing	700
Vacuum pumps	Mufflers on exhaust	500
	Duct to plant exterior	500
	Enclosure for snubber tank	100
Air blasts	Replace nozzles	200
Liquid pumps, dryers, motors	Enclose body	700
Feeders	Replace electromechanical with mechanical, add noise barriers	2000

MACHINERY NOISE DATA SHEET

Industry: Petroleum and Coal Products SIC: 29

Machine/Area: Coal Cleaning Plant

Noise Level before Treatment: ________ dbA

Noise Level after Treatment: ________ dbA

Cost of Treatment: $________

Treatment and Technology Used: ________

- Materials: ________
- Design Practices: ________
- Analysis Techniques: ________

Deleterious Effects of Treatment: ________

Measurement Techniques Used: ________

Sponsor of Work: Bureau of Mines

Comments: Problem Identifications of Coal Cleaning Noise are Given in General Term. Sound Absorption Coefficient of Some Materials are Given. See Reverse Side.

Source: Ungar and Fox, "On Noise Standard and Noise Control"
BRH Report [illegible], Bureau of Mines [illegible]

	500 HZ
Opening	1
Porous, Glass Fiberboard	0.8
Textured Acoustic Tiles	0.7
Carpet and Drapery	0.1-0.3
Plaster, Gypsum (Rough)	0.06
Wood Paneling	0.06
Plaster, Gypsum (Smooth)	0.03
Wood Door	0.03
Glass	0.027
Brick Wall (Unpainted)	0.03
Brick Wall (Painted)	0.017
Concrete Floor	0.015
Glazed Tile	0.01

MACHINERY NOISE DATA SHEET

Industry: Petroleum and Coal Products SIC: 29

Machine/Area: Coal Cleaning

Noise Level before Treatment: 100-101 dbA

Noise Level after Treatment: dbA

Cost of Treatment: $

Treatment and Technology Used:

- Materials:
- Design Practices:
- Analysis Techniques:

Deleterious Effects of Treatment:

Measurement Techniques Used: 3 ft. from the source

Sponsor of Work: Bureau Mines

Noise Source: (1) Horizontal Screen
(2) Empty Screen (1) Impact Noise
(3) Shaking Mech. Metal Lump on Metal

Comments: Identification of Noisemaking Mechanisms; No Solutions. Some Measurements of Noise Lines.

Source: Ungar, E. E. et al. "Generation of Impact Noise, Fluid Flow Noise and Structural Vibration in Coal Plant" BBN 2027 Bureau of Mines 75

MACHINERY NOISE DATA SHEET

Industry: Petroleum and Coal Products SIC: 29

Machine/Area: Coal Cleaning Plant

Noise Level before Treatment: ________ dbA

Noise Level after Treatment: ________ dbA

Cost of Treatment: $________

Treatment and Technology Used: ________

- Materials: ________
- Design Practices: ________
- Analysis Techniques: ________

Deleterious Effects of Treatment: ________

Measurement Techniques Used: ________

Sponsor of Work: Bureau of Mines

Comments: Economic View of Noise Reduction Measure. Consideration of Downtime. No Specific Technique Suggested

Source: Ungar, E. E. & Fax, G. E. "On Noise Generation and Control for Coal Preparation Plant" BBN Report, 1977, Bureau of Mines [illegible]

NO.

MACHINERY NOISE DATA SHEET

Industry: Rubber & Misc. Plastic Products SIC: 30

Machine/Area: Molding Shop (Plastic)

Noise Level before Treatment: ______ dbA

Noise Level after Treatment: ______ dbA

Cost of Treatment: $______

Treatment and Technology Used: (1)Remove all Direct Pipe-Clamping Devices; Replace with Flexible Mounting (2)Accurate Alignment of Electric Motor & pump. (3)Isolate Compressor. (4)Grinder & Granulator in Separate Building.

- Materials: ______
- Design Practices: ______
- Analysis Techniques: ______

Deleterious Effects of Treatment: ______

Measurement Techniques Used: ______

Sponsor of Work: Industrial

Comments: Sources of Noise (1)Hydraulic System (Pump) (2)Injection Machine General Discussion of Noise Generations and Their Prevention Measures

Source: Riding, J. "Reducing Noise in a Plastic Moulding Shop", Noise Control and Vibration Reduction, V 5,n 4 , 1974

MACHINERY NOISE DATA SHEET

Industry: Stone, Clay and Glass Products SIC: 32

Machine/Area: Eyeglass Automatic Assembly Area

Noise Level before Treatment: 91-101 dbA

Noise Level after Treatment: 90 dbA

Cost of Treatment: $ Unknown

Treatment and Technology Used: Manifold and Exhaust Mufflers, New Rollers and Cam Followers, High Viscosity Grease Coating of Moving Parts.

- Materials: Unknown
- Design Practices: Shop Rework
- Analysis Techniques:

Deleterious Effects of Treatment: Unknown

Measurement Techniques Used: Unknown

Sponsor of Work: Industrial

Comments:

Source: OSHA File 390

MACHINERY NOISE DATA SHEET

Industry: Stone, Clay and Glass Products SIC: 32

Machine/Area: Side Profiler

Noise Level before Treatment: 95 dbA

Noise Level after Treatment: Unknown dbA

Cost of Treatment: $ Unknown

Treatment and Technology Used: Replaced Single Blade Cutters with Multiblade cutters

- Materials: Unknown
- Design Practices: Shop Rework
- Analysis Techniques: Unknown

Deleterious Effects of Treatment: Unknown

Measurement Techniques Used: Unknown

Sponsor of Work: Industrial

Comments:

Source: OSHA File 713

MACHINERY NOISE DATA SHEET

Industry: Stone, Clay and Glass Products SIC: 32

Machine/Area: Top Profiler

Noise Level before Treatment: 105 dbA

Noise Level after Treatment: Unknown dbA

Cost of Treatment: $ Unknown

Treatment and Technology Used: Replaced Single Blade Cutters with Multiblade Cutters

- Materials: Unknown
- Design Practices: Rework
- Analysis Techniques: Unknown

Deleterious Effects of Treatment: Unknown

Measurement Techniques Used: Unknown

Sponsor of Work: Industrial

Comments:

Source: OSHA File 711

MACHINERY NOISE DATA SHEET

Industry: Primary Metal Industries SIC: 33

Machine/Area: Foundry Equipment

Noise Level before Treatment: ______dbA

Noise Level after Treatment: ______dbA

Cost of Treatment: $______

Treatment and Technology Used: ______

- Materials: ______
- Design Practices: ______
- Analysis Techniques: ______

Deleterious Effects of Treatment: ______

Measurement Techniques Used: ______

Sponsor of Work: ______

Comments: Noise abatement procedures in a control program for foundry equipment are discussed. Summary of various presently available techniques are discussed.

Source: Huskonen, W. D. "Machine Makers Tackle Noise", Foundry, v 99 n 11, 1971

MACHINERY NOISE DATA SHEET

Industry: Stone, Clay and Glass Products SIC: 32

Machine/Area: Stone Saw

Noise Level before Treatment: 91 dbA

Noise Level after Treatment: Unknown dbA

Cost of Treatment: $ Unknown

Treatment and Technology Used: Unknown

- Materials: Unknown
- Design Practices: Unknown
- Analysis Techniques: Unknown

Deleterious Effects of Treatment: Unknown

Measurement Techniques Used: Unknown

Sponsor of Work: Industrial

Comments:

Source: OSHA File (1)

Treatment and Techology Used:

Examples of measure being taken by equipment manufacturers to lower noise levels in foundries include:

(1) Pneumatic tools equipped with a remote exhaust hose surrounding the supply hose and up to 12 ft. long.

(2) Pneumatic hoists fitted with special mufflers to reduce exhaust air noise from 103 to 88 dB.

(3) Special muffling devices for arc-melting furnaces, including baffles to surround each electrode and a sound-absorbing panel for the slagging door.

(4) A manufacturer of automatic molding machines offers a noise control option which includes oversized mufflers for exhaust from air valves, silent-type hydraulic pumps, and rubberized stops and contact points.

(5) A molding machine manufacturer will equip machines upon request with air-cushioned vibrators and air pressure limiters, for minimizing exhaust velocity.

(6) A manufacturer of vibrating conveyors has experimented with energy-absorbing rubber in a steel "sandwich" as a sound-reducing conveyor deck for moving castings.

To date, all noise control features for foundry equipment are offered as optional extras, adding to the cost of the equipment. There may be in some instances, a slight penalty in equipment performance.

MACHINERY NOISE DATA SHEET

Industry: Primary Metals SIC: 33

Machine/Item: [illegible]

Noise Level before Treatment: 122-127 dbA

Noise Level after Treatment: Unknown dbA

Cost of Treatment: $ Unknown

Treatment and Technique Used: (1) Hearing protective equipment issued, (2) Machine reworked to increase mass and stiffness (3) Vibration damping mounting pads installed (4) Three-sided enclosure installed.

- Materials: Unknown
- Design Practices: Rework
- Analysis Technique: Unknown

Deleterious Effects of Treatment: Unknown

Measurement Techniques Used: Unknown

Sponsor of Work: Industrial

Comments:

Source: OSHA File [illegible]

MACHINERY NOISE DATA SHEET

Industry: Primary Metals SIC: 33

Machine/Area: 16 inch Steel Rolling Mill

Noise Level before Treatment: 92-93 dbA

Noise Level after Treatment: 83 dbA

Cost of Treatment: $ Unknown

Treatment and Technology Used: (1) Ventilation Fan Speed Reduced from 1200 RPM, (2) Section of Steel Floor Plate Replaced, (3) Equipment Maintenance Program Improved

- Materials:
- Design Practices: Shop Rework
- Analysis Techniques: Unknown

Deleterious Effects of Treatment: Unknown

Measurement Techniques Used: Unknown

Sponsor of Work: Industrial

Comments:

Source: OSHA File 790

MACHINERY NOISE DATA SHEET

Industry: Primary Metals SIC: 33

Machine/Area: Knockout Bench

Noise Level before Treatment: 114 dbA

Noise Level after Treatment: 89 dbA

Cost of Treatment: $

Treatment and Technology Used: (1)Enclosure (2)Hood Around Bench Was Lined With 1 inch Foam. (3)1½ x 2½ x 14 inch absorbers were hung inside enclosure.

- Materials: Unknown
- Design Practices: Unknown
- Analysis Techniques: Unknown

Deleterious Effects of Treatment: Unknown

Measurement Techniques Used: Spectrum Analysis

Sponsor of Work: Industrial

Comments:

Source: OSHA File 307

MACHINERY NOISE DATA SHEET

Industry: Primary Metals SIC: 33

Machine/Area: Molding Shakeout

Noise Level before Treatment: 103-108 dbA

Noise Level after Treatment: <90 dbA

Cost of Treatment: $ Unknown

Treatment and Technology Used: (1) Vibrating Pan Lined With Rubber (2) Rubber Pad on Drop Area At the Discharge Point, (3) Sound Barrier Curtain at Shot Blast Cleaning Machine

- Materials: Rubber
- Design Practices: Unknown
- Analysis Techniques: Unknown

Deleterious Effects of Treatment: Unknown

Measurement Techniques Used: Unknown

Sponsor of Work: Industrial

Comments:

Source: OSHA File 369

MACHINERY NOISE DATA SHEET

Industry: Primary Metal Industries SIC: 33

Machine/Area: Shakeout, 30ft^2 (½-1ft^3 castings)

Noise Level before Treatment: ______ dbA } 2-5 ft from machine

Noise Level after Treatment: Unknown dbA }

Cost of Treatment: $ Unknown

Treatment and Technology Used: Unknown

- Materials: Unknown
- Design Practices: Unknown
- Analysis Techniques: Unknown

Deleterious Effects of Treatment: Unknown

Measurement Techniques Used: Unknown

Sponsor of Work: Unknown

Comments:

Source: Control of Noise, American Foundrymen's Society.

MACHINERY NOISE DATA SHEET

Industry: Primary Metal Industries SIC: 33

Machine/Area: Shakeout, 10ft.^{3} (½-1ft^3 castings)

Noise Level before Treatment: 105 dbA

Noise Level after Treatment: Unknown dbA

3-5 ft from Machine

Cost of Treatment: $Unknown

Treatment and Technology Used: Unknown

- Materials: Unknown
- Design Practices: Unknown
- Analysis Techniques: Unknown

Deleterious Effects of Treatment: Unknown

Measurement Techniques Used: Unknown

Sponsor of Work: Unknown

Comments:

Source: Control of Noise, American Foundrymen's Society

MACHINERY NOISE DATA SHEET

Industry: Primary Metal Industries SIC: 33

Machine/Area: Shakeout, 10ft x 10ft (2-1ft^3 Castings)

Noise Level before Treatment: 108 dbA 2-3 ft from machine

Noise Level after Treatment: Unknown dbA

Cost of Treatment: $ Unknown

Treatment and Technology Used: Unknown

- Materials: Unknown
- Design Practices: Unknown
- Analysis Techniques: Unknown

Deleterious Effects of Treatment: Unknown

Measurement Techniques Used: Unknown

Sponsor of Work: Unknown

Comments:

Source: Control of Noise, American Foundrymen's Society

MACHINERY NOISE DATA SHEET

Industry: Primary Metals SIC: 33

Machine/Area: Shakeout Area

Noise Level before Treatment: 93-102 dbA

Noise Level after Treatment: <90 dbA

Cost of Treatment: $

Treatment and Technology Used: Acoustic Walls. Acoustic lining to existing enclosure. Rubber lining on tumbling mills.

- Materials: Rubber
- Design Practices: Unknown
- Analysis Techniques: Unknown

Deleterious Effects of Treatment: Unknown

Measurement Techniques Used: Unknown

Sponsor of Work: Industrial

Comments:

Source: OSHA File [illegible]

MACHINERY NOISE DATA SHEET

Industry: Primary Metals SIC: 33

Machine/Area: Tumbling Barrel

Noise Level before Treatment: 100 dbA

Noise Level after Treatment: 80 dbA

Cost of Treatment: $ Unknown

Treatment and Technology Used: Lined inside of tumbling barrel with resilient rubber

- Materials: Rubber
- Design Practices: Rework
- Analysis Techniques: Unknown

Deleterious Effects of Treatment: Unknown

Measurement Techniques Used: Unknown

Sponsor of Work: Industrial

Comments: No appreciable wear in 1 year

Source: OSHA File 743

MACHINERY NOISE DATA SHEET

Industry: Primary Metals SIC: 33

Machine/Area: Tumbling Barrels

Noise Level before Treatment: 100 dBA

Noise Level after Treatment: Drop 10 to 20 dBA

Cost of Treatment: $ Unknown

Treatment and Technology Used: Enclose with plywood frame and fiberglass lining; line tumbling barrels with rubber

- Materials: Rubber, Fiberglass, Plywood
- Design Practices:
- Analysis Techniques:

Deleterious Effects of Treatment: Unknown

Measurement Techniques Used: Accepted Practices - At worker hearing zone per indus. 11.03 and 11.06

Sponsor of Work: Industrial

Comments:

Source: Control of Hazardous Industrial Noise Exposures, DOL, OSHA, Contract No. 05-55-10-01-72

MACHINERY NOISE DATA SHEET

Industry: Primary Metals SIC: 33

Machine/Area: Tumbling Barrel

Noise Level before Treatment: 111 dbA } 5 ft in front of barrel

Noise Level after Treatment: 88 dbA

Cost of Treatment: $ Unknown

Treatment and Technology Used: Enclosure – ½ inch hardboard over 1 inch fibrous sheathing on both sides of 2 x 4 studs. The 4 inch space wa filled with rockwool batts.

- Materials: See Treatment
- Design Practices: Unknown
- Analysis Techniques: Unknown

Deleterious Effects of Treatment: Unknown

Measurement Techniques Used: Unknown

Sponsor of Work: U. S. Navy

Comments: Sounds similar to OSHA File 740

Source: OSHA File 742

MACHINERY NOISE DATA SHEET

Industry: Primary Metals SIC: 33

Machine/Area: Tumbling Barrel

Noise Level before Treatment: 97 dbA

Noise Level after Treatment: 88 dbA

Cost of Treatment: $ Unknown

Treatment and Technology Used: Machine housing was lined with 1 inch thick fiberglass, inside of door was lined with Minnesota Mining underseal.

- Materials: See Treatment
- Design Practices: Rework
- Analysis Techniques: Unknown

Deleterious Effects of Treatment: Unknown

Measurement Techniques Used: Spectrum analysis

Sponsor of Work: Industrial

Comments:

Source: OSHA File 211

MACHINERY NOISE DATA SHEET

Industry: Primary Metal Industries SIC: 33

Machine/Area: Tumbler, 36"x72" Small Castings

Noise Level before Treatment: 100 dbA } 2-3 ft from machine

Noise Level after Treatment: Unknown dbA

Cost of Treatment: $ Unknown

Treatment and Technology Used: Unknown

- Materials: Unknown
- Design Practices: Unknown
- Analysis Techniques: Unknown

Deleterious Effects of Treatment: Unknown

Measurement Techniques Used: Unknown

Sponsor of Work: Unknown

Comments:

Source: Control of Noise, American Foundrymen's Society

MACHINERY NOISE DATA SHEET

Industry: Primary Metals SIC: 33

Machine/Area: Slotted Tumblers

Noise Level before Treatment: 110 dbA

Noise Level after Treatment: 89 dbA

Cost of Treatment: $ Unknown

Treatment and Technology Used: Enclosure-¼ inch tempered masonite over 1 inch thick fibrous sheathing on the outside of 2x4 studs and another 1" thick sheathing on the inside of the studs. 4 inch spacing filled with rock wool batts.

- Materials: See Treatment
- Design Practices: Unknown
- Analysis Techniques: Unknown

Deleterious Effects of Treatment: Unknown

Measurement Techniques Used: Spectrum Analysis

Sponsor of Work: Unknown

Comments:

Source: OSHA File 740

MACHINERY NOISE DATA SHEET

Industry: Primary Metals SIC: 33

Machine/Area: Tumbler

Noise Level before Treatment: 108 dbA

Noise Level after Treatment: 91-96 dbA

Cost of Treatment: $ 4500

Treatment and Technology Used: Rubber liners on tumbling machines

- Materials: Rubber
- Design Practices: Rework
- Analysis Techniques: Unknown

Deleterious Effects of Treatment: Some production and maintenance impact-quantity unknown

Measurement Techniques Used: Unknown

Sponsor of Work: Industrial

Comments:

Source: OSHA File 738

MACHINERY NOISE DATA SHEET

Industry: Primary Metal Industries SIC: 33

Machine/Area: Chipping Hammers

Noise Level before Treatment: 110-120 dBA

Noise Level after Treatment: 90-100 dBA

Cost of Treatment: $ Unknown

Treatment and Technology Used: Replaced Chipping Hammers with "Flame Washing": an O_2 Acetylene Torch is Applied Obliquely to Rough Casting Surfaces

- Materials:
- Design Practices: Process Substitution
- Analysis Techniques:

Deleterious Effects of Treatment: Unknown

Measurement Techniques Used: Unknown

Sponsor of Work: Industrial

Comments: Not Universally Applicable

Source: R. V. Webster, "Anti-noise Ideas," Publication Unknown

MACHINERY NOISE DATA SHEET

Industry: Primary Metal Industries SIC: 33

Machine/Area: Pneumatic Chipper, 100 psi(1-ft^3 Castings)

Noise Level before Treatment: 112 dbA } 2-5 ft from machine

Noise Level after Treatment: Unknown dbA

Cost of Treatment: $ Unknown

Treatment and Technology Used: Unknown

- Materials: Unknown
- Design Practices: Unknown
- Analysis Techniques: Unknown

Deleterious Effects of Treatment: Unknown

Measurement Techniques Used: Unknown

Sponsor of Work: Unknown

Comments:

Source: Control of Noise, American Foundrymen's Society.

MACHINERY NOISE DATA SHEET

Industry: Primary Metal Industries SIC: 33

Machine/Area: Pneumatic Chipper, 100psi (1-3ft^3 Castings)

Noise Level before Treatment: 112 dbA
Noise Level after Treatment: Unknown dbA
} 2-5 ft from machine

Cost of Treatment: $ Unknown

Treatment and Technology Used: Unknown

- Materials: Unknown
- Design Practices: Unknown
- Analysis Techniques: Unknown

Deleterious Effects of Treatment: Unknown

Measurement Techniques Used: Unknown

Sponsor of Work: Unknown

Comments:

Source: Control of Noise, American Foundrymen's Society.

MACHINERY NOISE DATA SHEET

Industry: Primary Metal Industries SIC: 33

Machine/Area: Pushup Machine, 15"x15" Sand Molding

Noise Level before Treatment: 102 dbA } 2-3 ft from machine

Noise Level after Treatment: Unknown dbA

Cost of Treatment: $ Unknown

Treatment and Technology Used: Unknown

- Materials: Unknown
- Design Practices: Unknown
- Analysis Techniques: Unknown

Deleterious Effects of Treatment: Unknown

Measurement Techniques Used: Unknown

Sponsor of Work: Unknown

Comments:

Source: Control of Noise, American Foundrymen's Society

MACHINERY NOISE DATA SHEET

Industry: Primary Metal Industries SIC: 33

Machine/Area: Jolt Squeeze Machine, 13" Sand Molding

Noise Level before Treatment: 100 dbA } 2-5 ft from machine

Noise Level after Treatment: Unknown dbA

Cost of Treatment: $ Unknown

Treatment and Technology Used: Unknown

- Materials: Unknown
- Design Practices: Unknown
- Analysis Techniques: Unknown

Deleterious Effects of Treatment: Unknown

Measurement Techniques Used: Unknown

Sponsor of Work: Unknown

Comments:

Source: Control of Noise, American Foundrymen's Society

MACHINERY NOISE DATA SHEET

Industry: Primary Metal Industries SIC: 33

Machine/Area: Pneumatic Ram, 100psi Sand Mold Ramming

Noise Level before Treatment: 90 dbA } 3-5ft from machine

Noise Level after Treatment: Unknown dbA

Cost of Treatment: $ Unknown

Treatment and Technology Used: Unknown

- Materials: Unknown
- Design Practices: Unknown
- Analysis Techniques: Unknown

Deleterious Effects of Treatment: Unknown

Measurement Techniques Used: Unknown

Sponsor of Work: Unknown

Comments:

Source: Control of Noise, American Foundrymen's Society

MACHINERY NOISE DATA SHEET

Industry: Primary Metal Industries SIC: 33

Machine/Area: Core Blower

Noise Level before Treatment: 110 dbA } 2-3ft from machine

Noise Level after Treatment: Unknown dbA

Cost of Treatment: $ Unknown

Treatment and Technology Used: Unknown

- Materials: Unknown
- Design Practices: Unknown
- Analysis Techniques: Unknown

Deleterious Effects of Treatment: Unknown

Measurement Techniques Used: Unknown

Sponsor of Work: Unknown

Comments:

Source: Control of Noise, American Foundrymen's Society

MACHINERY NOISE DATA SHEET

Industry: Primary Metals SIC: 33

Machine/Area: Grinding Area

Noise Level before Treatment: 93-100 dbA

Noise Level after Treatment: Unknown dbA

Cost of Treatment: $ Unknown

Treatment and Technology Used: Unknown

- Materials:
- Design Practices:
- Analysis Techniques:

Deleterious Effects of Treatment: Unknown

Measurement Techniques Used: Unknown

Sponsor of Work: Industrial

Comments:

Source: OSHA File 744

MACHINERY NOISE DATA SHEET

Industry: Primary Metal Industries SIC: 33

Machine/Area: Stand Grinder, 36"

Noise Level before Treatment: 95 dbA } 2-5ft from machine

Noise Level after Treatment: Unknown dbA

Cost of Treatment: $ Unknown

Treatment and Technology Used: Unknown

- Materials: Unknown
- Design Practices: Unknown
- Analysis Techniques: Unknown

Deleterious Effects of Treatment: Unknown

Measurement Techniques Used: Unknown

Sponsor of Work: Unknown

Comments:

Source: Control of Noise, American Foundrymen's Society

MACHINERY NOISE DATA SHEET

Industry: Primary Metal Industries SIC: 33

Machine/Area: Pre-mix burner, 2" Outlet, gas crucible heat

Noise Level before Treatment: 94 dbA } 2-3 ft from machine

Noise Level after Treatment: Unknown dbA

Cost of Treatment: $ Unknown

Treatment and Technology Used: Unknown

- Materials: Unknown
- Design Practices: Unknown
- Analysis Techniques: Unknown

Deleterious Effects of Treatment: Unknown

Measurement Techniques Used: Unknown

Sponsor of Work: Unknown

Comments:

Source: Control of Noise, American Foundrymen's Society

MACHINERY NOISE DATA SHEET

Industry: Primary Metal Industries SIC: 33

Machine/Area: Electric Furnace 30 ton

Noise Level before Treatment: 103 dbA } 2-5ft from machine

Noise Level after Treatment: Unknown dbA

Cost of Treatment: $ Unknown

Treatment and Technology Used: Unknown

- Materials: Unknown
- Design Practices: Unknown
- Analysis Techniques: Unknown

Deleterious Effects of Treatment: Unknown

Measurement Techniques Used: Unknown

Sponsor of Work: Unknown

Comments:

Source: Control of Noise, American Foundrymen's Society.

MACHINERY NOISE DATA SHEET

Industry: Primary Metal Industries SIC: 33

Machine/Area: Air Hoist, 2000 lb, Pneumatic

Noise Level before Treatment: 112 dbA } 2-5 ft from machine

Noise Level after Treatment: Unknown dbA

Cost of Treatment: $ Unknown

Treatment and Technology Used: Unknown

- Materials: Unknown
- Design Practices: Unknown
- Analysis Techniques: Unknown

Deleterious Effects of Treatment: Unknown

Measurement Techniques Used: Unknown

Sponsor of Work: Unknown

Comments:

Source: Control of Noise, American Foundrymen's Society.

MACHINERY NOISE DATA SHEET

Industry: Primary Metal Industries SIC: 33

Machine/Area: Sand Slinger

Noise Level before Treatment: 102 dbA } 2-3ft from machine

Noise Level after Treatment: Unknown dbA

Cost of Treatment: $ Unknown

Treatment and Technology Used: Unknown

- Materials: Unknown
- Design Practices: Unknown
- Analysis Techniques: Unknown

Deleterious Effects of Treatment: Unknown

Measurement Techniques Used: Unknown

Sponsor of Work: Unknown

Comments:

Source: Control of Noise, American Foundrymen's Society

MACHINERY NOISE DATA SHEET

Industry: Primary Metal Industries SIC: 33

Machine/Area: Scarfing, Acetylene Weld Equipment

Noise Level before Treatment: 91 dbA } 3-5 ft from machine

Noise Level after Treatment: Unknown dbA

Cost of Treatment: $ Unknown

Treatment and Technology Used: Unknown

- Materials: Unknown
- Design Practices: Unknown
- Analysis Techniques: Unknown

Deleterious Effects of Treatment: Unknown

Measurement Techniques Used: Unknown

Sponsor of Work: Unknown

Comments:

Source: Control of Noise, American Foundrymen's Society.

MACHINERY NOISE DATA SHEET

Industry: Primary Metals SIC: 33

Machine/Area: Molding Area

Noise Level before Treatment: 96 dbA

Noise Level after Treatment: Unknown dbA

Cost of Treatment: $ Unknown

Treatment and Technology Used: Unknown

- Materials: Unknown
- Design Practices: Unknown
- Analysis Techniques: Unknown

Deleterious Effects of Treatment: Unknown

Measurement Techniques Used: Unknown

Sponsor of Work: Industrial

Comments:

Source: OSHA File 744

MACHINERY NOISE DATA SHEET

Industry: Fabricating Metal Products SIC: 34

Machine/Area: General

Noise Level before Treatment: ____ dbA

Noise Level after Treatment: ____ dbA

Cost of Treatment: $____

Treatment and Technology Used: ____

- Materials: ____
- Design Practices: ____
- Analysis Techniques: ____

Deleterious Effects of Treatment: ____

Measurement Techniques Used: ____

Sponsor of Work: See Attached

Comments: ____

Source: ____

(1) NOISE: 72N00216
(2) LANGUAGE: EN
(3) COUNTRY OF ORIGIN: United States
(4) NUMBER OF REFERENCES: 000
(5) NUMBER OF FIGURES/TABLES: 000
(6) DATE OF LAST ENTRY: 74/11/14
(8) CORPORATE SOURCE CODE: 1G132108
1G132108
(9) AUTHOR: DIEHL, G.M.
(11) TITLE: THINK QUIET: PART XI - SOUND CONTROL RECOMMENDATIONS
(13) SOURCE DOCUMENT TITLE: Compressed Air
(14) SOURCE DOCUMENT IDENTIFIER: Vol 79 No 12:20-21, 1974
(17) PUBLISHED TERMS: INDUSTRIAL NOISE; MACHINERY NOISE
(18) UNPUBLISHED TERMS: INDUSTRIAL EQUIPMENT NOISE; MACHINERY QUIETING

This last in a series of articles is a listing of 35 operating, engineering, and maintenance recommendations for abating noise in industrial machinery. Briefly, these recommendations are:

(1) Reducing horsepower.
(2) Reduce speed.
(3) Keep impeller tip speeds low.
(4) Improve dynamic balance.
(5) Reduce the ratio of rotating masses to fixed masses.
(6) Reduce mechanical run-out of shafts.
(7) Avoid structural resonances.
(8) Eliminate or reduce impacts.
(9) Reduce peak acceleration.
(10) Improve lubrication.
(11) Maintain closer tolerances and clearances in bearings and moving parts.
(12) Install bearings correctly.
(13) Improve alignment.
(14) Use center-of-gravity mounting whenever feasible.
(15) Maintain adequate separation between operating speeds and lateral and torsional resonant speeds.
(16) Consider the shape of impeller vanes from an acoustic standpoint.
(17) Keep the distance between impeller vanes and cutwater, or diffuser, vanes as large as possible.
(18) Select combinations of rotating and stationary vanes that are not likely to excite strong vibration and noise.
(19) Design turning vanes properly.
(20) Keep areas of inlet passages as large as possible and their length as short as possible.
(21) Remove or keep at a minimum any obstructions, bends, or abrupt changes in fluid passages.
(22) Pay special attention to inlet design
(23) Pay attention to discharge design, although the inlet is more important than the discharge, from an acoustic standpoint.
(24) Maintain gradual, not abrupt, transition from one area to the next in all fluid passages.
(25) Reduce flow velocities in passages, pipes, and the like.
(26) Reduce jet velocities.
(27) Reduce large radiating areas.

(28) Disconnect possible sound radiating parts from other vibrating parts by installing vibration breaks to eliminate metal-to-metal contact.

(29) Provide openings, or air leaks, in large radiation areas so that air can move through them.

(30) Reduce clearances, piston weights, and connecting rod weights in reciprocating machinery to reduce piston impacts.

(31) Apply additional sound-control devices, such as inlet and discharge silencers and acoustic enclosures.

(32) When acoustic enclosures are used, make sure that all openings are sealed properly.

(33) Install machinery on adequate mountings and foundations to reduce structure-borne sound and directivity effects whenever possible by directing inlet and discharge openings away from listeners or critical areas.

(34) Use quiet components, such as motors, gears, and auxiliary equipment, purchased to meet your company's sound specifications.

MACHINERY NOISE DATA SHEET

Industry: Fabricated Metal Products SIC: 34

Machine/Area: General Metalworking Area

Noise Level before Treatment: ____ dbA

Noise Level after Treatment: ____ dbA

Cost of Treatment: $ ____

Treatment and Technology Used: ____

- Materials: ____
- Design Practices: ____
- Analysis Techniques: ____

Deleterious Effects of Treatment: ____

Measurement Techniques Used: ____

Sponsor of Work: ____

Comments: Generalized discussion of noise problem of metal industry

Source: Gursen, H. "Study of Environmental Conditions and Problems in the Metal Industry" Conference on problems relating to environment, Geneva Economic Commission for Europe 1971

MACHINERY NOISE DATA SHEET

Industry: Fabricated Metal Products SIC: 34

Machine/Area: General

Noise Level before Treatment: ______ dbA

Noise Level after Treatment: ______ dbA

Cost of Treatment: $______

Treatment and Technology Used: (1) Installing Muffler for Air Cooled Motor (2) Elastomer-cushioned Stripper Plate for Hi-Speed Stamping Press (3) [illegible] Tube Liner for Auto-Screw Machine (4) Vibration Isolating Method (5) Enclosures

- Materials: ______
- Design Practices: ______
- Analysis Techniques: ______

Deleterious Effects of Treatment: ______

Measurement Techniques Used: ______

Sponsor of Work: ______

Comments: See Next Page for Cost and Avg Attenuation for Various method.

Source: Vargas, L. F. Methods of Noise Control for Machinery Already Installed, NOISE-CON 73, Washington, D. C., October 15-17, 1973

Control Option	Attenuation (dBA)	Unit Cost (per sq ft or each)	Productivity Penalty
Absorption	3-5	$.50-$2.00	None
Damping	3-10	$.70-$4.00	None
Barriers	5-15	$2.00-$3.00	Up to 15 percent
"Glove Box" Booths	3-15	$250-400 each	Up to 20 percent
Machine Enclosures	5-50	$4.00-$8.00	Up to 25 percent
Worker Shelters	5-20	$250-1000 each	None

MACHINERY NOISE DATA SHEET

Industry: Fabricated Metal Products SIC: 34

Machine/Area: Flame Cutting

Noise Level before Treatment: ______ dbA

Noise Level after Treatment: ______ dbA

Cost of Treatment: $______

Treatment and Technology Used: Ear Plug

- Materials:
- Design Practices:
- Analysis Techniques:

Deleterious Effects of Treatment:

Measurement Techniques Used:

Sponsor of Work:

Comments: Ear plug seems to be the only solution.

Source: Burgess, W. A. & Reist, P. C. "Industrial Hygiene Study of Flame Cutting a Granite Quarry" American Industrial Hygiene Assoc. Journal, v 30 , 1969

MACHINERY NOISE DATA SHEET

Industry: Fabricated Metal Products SIC: 34

Machine/Area: Common Machinery

Noise Level before Treatment: ________ dbA

Noise Level after Treatment: ________ dbA

Cost of Treatment: $________

Treatment and Technology Used: (1) Partial Enclosure of Wood Saw (10-13dB+) (2) Enclosure for Forge-Presses (13dB+) (3) Composite Barrier for Gear Housing (10dB+) (4) Isolation Mount, Elastic compound on outside of stock feed tube, Vibration Damping & Barrier for Lathe (15-20dB+)

- Materials:
- Design Practices:
- Analysis Techniques:

Deleterious Effects of Treatment:

Measurement Techniques Used:

Sponsor of Work:

Comments:

Source: Mateer, C. L. "Workable Solution to Common Machinery Noise Problems" Pollution Engineering Vol. 6 No. 1, 1974.

MACHINERY NOISE DATA SHEET

Industry: Fabricated Metal Products SIC: 34

Machine/Area: Metalworking Area

Noise Level before Treatment: ________dbA

Noise Level after Treatment: ________dbA

Cost of Treatment: $________

Treatment and Technology Used: Noise Limit for all Equipment the Industry Purchases.

- Materials:
- Design Practices:
- Analysis Technique:

Deleterious Effects of Treatment: Approximately 5-10 percent Higher Cost for Low Noise Equipments

Measurement Techniques Used:

Sponsor of Work:

Comments: See Next Page for Typical Noise Level for Metalworking [illegible]

Source: Iron Age, Dec. 1971, "Metalworking Noise is a Pain in the Ear"

General Motors has established noise limits for all equipment it purchases. In part, GM's standards state that all steady state or cyclical noise levels produced by machinery or equipment at the operator's position, and at all other points three feet from the equipment, must not exceed 80 dBA. In addition, quotations must include the cost required to meet this noise specification, stated as an alternate and separate item to the cost of the vendor's standard product. GM has found that equipment meeting their noise limitations cost five to ten percent over the original cost.

Noise levels of typical metalworking processes are shown in the table below.

	Noise Levels (dBA)
Painful:	
Jet taking off	140
Riveting*	100-132
Deafening and approaching the threshold of feeling:	
Wing bar drop press	128
Pneumatic chipper	113-127
Drop hammer	110-135
Casting shakeout	110-120
Electric furnace	110-120
Shearing operation*	110-120
Shot blasting	
Deafening:	
Between two drills*	117(use 3dB)
Planning machines	110-115
Routers	110-115
Sheetmetal speed hammer	110-115
Swager	108-118
Between two compressors	110
Metal parts tumbling down metal chute	110
Circular saw	105-116
Shell press	98-117
Mechanical punch press*	95-112
Very loud:	
Cold header	103-108
Plasma cutting	104-105
High speed band saw*	90-105
Auto screw machine	98-105
Ball mill	100
Large generator	100
Polishing and buffing machines*	90-100
Turning machines (unloaded)*	80-95
Grinders*	80-95
4-5 axis milling machine (unloaded)	85-90
Machining centers (unloaded)*	85-90
Die casting machine	75-85
Bending and forming machines *	

* Most widely used machine tools in American industry

MACHINERY NOISE DATA SHEET

Industry: Fabricated Metal Products SIC: 34

Machine/Area: Forging Machinery and Others

Noise Level before Treatment: ______ dbA

Noise Level after Treatment: ______ dbA

Cost of Treatment: $______

Treatment and Technology Used: ______

- Materials: ______
- Design Practices: ______
- Analysis Techniques: ______

Deleterious Effects of Treatment: ______

Measurement Techniques Used: ______

Sponsor of Work: ______

Comments: Problem Identifications and Control Approaches to the Problem of Forging Industry Noise. Statistics are on Reverse Side.

Source: Jensen, J. E. "An Industry-Univ. Approach to Forging Noise Control" Sound & Vibration Vol. 8, 197[illegible]

	Noise Level (dBA)
hammers	108-124
ring operations	112-121
coolers	93-98
ting furnaces	94-104
(descalers, parts removal, torches)	Automated descalers - 110-112 Air nozzles - 95
nders (belt and wheel)	95-106
m leaks	109
lers	104-131
and steam exhaust valves	Clutch of mech. press - 132 power hoist - 110-115
ff saw	96
m exhaust on roof	102
rials handling	110-115
ning bells, buzzers, horns	120

Rated Hammer Size (lb)	Maximum Noise Level dBA - Fast	Maximum Peak Noise Level (dB)
1,500	111-122	131-142
2,000	119-129	141-148
2,500	117-129	142
3,000	110	143-146
4,000	120-124	139
6,000	110	-
12,000	118	-
14,000	115	148
15,000	108	-
16,000	116	-
18,000	120-124	146-150+
24,000	-	146-150+
30,000	-	146-150+

MACHINERY NOISE DATA SHEET

Industry: Fabricated Metal Products Machine Noise(General) SIC: 34

Machine/Area: Machine (Portable)

Noise Level before Treatment: ______ dbA

Noise Level after Treatment: ______ dbA

Cost of Treatment: $______

Treatment and Technology Used: Barrier Shielding and Enclosure

- Materials:
- Design Practices: Small open areas of enclosures
- Analysis Techniques: Attenuation as a plot of noise level or a function of system dimensions in wave length and angle between barrier top & source line and barrier-top-observer line

Deleterious Effects of Treatment:

Measurement Techniques Used:

Sponsor of Work:

Comments: Study of Barrier, Acoustic Shielding

Source: Macduff, J. S. "Barriers for Noise Control" Mechanical Engineering Vol. 96 No. 4, 1974

MACHINERY NOISE DATA SHEET

Industry: Fabricated Metal Products SIC: 34

Machine/Area: Machine Press Factories

Noise Level before Treatment: 95-104 dbA

Noise Level after Treatment: ______ dbA

Cost of Treatment: $______

Treatment and Technology Used:

- Materials:
- Design Practices:
- Analysis Techniques:

Deleterious Effects of Treatment:

Measurement Techniques Used: 1.3m from ground; 1m from the sources

Sponsor of Work:

Noise Sources (1) Crank Case
(2) Clutch and Exhaust } of press machines
(3) Anchor Bolt

Comments: Noise and vibration data from 29 machine press factories in Tokyo

Source: Takayama, T. & Chiba, Y. "Noise and Vibration at a Pressing Factory" Puresu Kojo no Soon, Shindo ni Tsuite Annual Report of the Tokyo Met. Research Inst. for Environ. Protec. 1973, v 4, 1973

MACHINERY NOISE DATA SHEET

Industry: Fabricated Metal Products SIC: 34

Machine/Area: Impact Forming Machinery

Noise Level before Treatment: ______ dbA

Noise Level after Treatment: ______ dbA

Cost of Treatment: $______

Treatment and Technology Used: Increase Momentum of impacting object just before impact.

- Materials:
- Design Practices:
- Analysis Techniques:

Deleterious Effects of Treatment:

Measurement Techniques Used: Microphone 4ft away from the source (0-2000 H.Z.

Sponsor of Work:

Noise Source: Impact of two solid bodies, Explosions

Comments: Academic Approach

Source: Yadav, U.P. "Impulsive Noise Generated in Impact Forming Machinery" Applied Acoustics Vol. 7 No. 4, pp 295-310, 1974

MACHINERY NOISE DATA SHEET

Industry: Fabricated Metal Products SIC:

Machine/Area: Machinery Impact Noise Producing Areas

Noise Level before Treatment: __________dbA

Noise Level after Treatment: __________dbA

Cost of Treatment: $

Treatment and Technology Used: Changing Process, Modifying Process, Covering Machinery, Modifying Environment, Isolating People.

- Materials:
- Design Practices:
- Analysis Techniques:

Deleterious Effects of Treatment:

Measurement Techniques Used:

Noise Sources: Machinery Aerodynamic Noise, Impact Noise, Machinery Vibrations.

Comments: General Discussion, Identification of Noise Sources and General Approach for Quieting.

Source: Berkovitch, I. "Quiet Please" Engineering, v 214 n 3, 1974

MACHINERY NOISE DATA SHEET

Industry: Fabricated Metal Products SIC: 34

Machine/Area: Machining Metal Parts

Noise Level before Treatment: 92-100 dbA

Noise Level after Treatment: 81 dbA

Cost of Treatment: $ 50/Unit

Treatment and Technology Used: Replaced compressed air chip blowing with liquid flushing

- Materials: -
- Design Practices: Machine Mod.
- Analysis Techniques: None indicated

Deleterious Effects of Treatment: Unknown

Measurement Techniques Used: Unknown

Sponsor of Work: Industrial

Comments:

Source: OSHA Files 803 & 793

MACHINERY NOISE DATA SHEET

Industry: Fabricating Metal Products SIC: 34

Machine/Area: Automatic Cutoff Saw

Noise Level before Treatment: 101 dbA

At operator ear

Noise Level after Treatment: 80 dbA

Cost of Treatment: $ 1000

Treatment and Technology Used: Enclosure

- Materials: Unknown
- Design Practices:
- Analysis Techniques:

Deleterious Effects of Treatment: Unknown

Measurement Techniques Used: Unknown

Sponsor of Work: Industrial

Comments:

Source: OSHA File 695

MACHINERY NOISE DATA SHEET

Industry: Fabricated Metal Products SIC: 34

Machine/Area: Cutoff Saw

Noise Level before Treatment: 123 dbA

Noise Level after Treatment: 95 dbA

Cost of Treatment: $ 800

Treatment and Technology Used: Enclosure with Acoustic Material with Plexiglass Viewpoint

- Materials: Unknown
- Design Practices:
- Analysis Techniques:

Deleterious Effects of Treatment: Production Reduced 15 Percent

Measurement Techniques Used: Unknown

Sponsor of Work: Industrial

Comments:

Source: OSHA File 694

MACHINERY NOISE DATA SHEET

Industry: Fabricated Metal Products SIC: 34

Machine/Area: Pin Machine

Noise Level before Treatment: 102-106 dbA

Noise Level after Treatment: 85 dbA

Cost of Treatment: $ 1000

Treatment and Technology Used: Machine Moved to a Basement Room Partially Lined With Sound Absorbent Material and Enclosed in an Acoustically Lined Box.

- Materials: Unknown
- Design Practices: Unknown
- Analysis Techniques: Unknown

Deleterious Effects of Treatment: Uknown

Measurement Techniques Used: Unknown

Sponsor of Work: Industrial

Comments:

Source: OSHA File 801 & 811

MACHINERY NOISE DATA SHEET

Industry: Fabricated Metal Products SIC: 34

Machine/Area: Automatic Spot Welding Machines

Noise Level before Treatment: 95-97 dbA

Noise Level after Treatment: "Permissible Standards" dBA

Cost of Treatment: $ Unknown

Treatment and Technology Used: Enclosure

- Materials: "Metal and Plexiglass"
- Design Practices:
- Analysis Techniques:

Deleterious Effects of Treatment: Unknown

Measurement Techniques Used: Unknown

Sponsor of Work: Industrial

Comments:

Source: OSHA File [illegible]

MACHINERY NOISE DATA SHEET

Industry: Fabricated Metal Products SIC: 34

Machine/Area: Grinding Exhaust Pipe

Noise Level before Treatment: 89 to 99 dbA

Noise Level after Treatment: 95 dbA

Cost of Treatment: $ Unknown

Treatment and Technology Used: Three-Sided Enclosure Plus Ear Plugs

- Materials: Unknown
- Design Practices:
- Analysis Techniques:

Deleterious Effects of Treatment: Unknown
(Probably None)

Measurement Techniques Used: Unknown

Sponsor of Work: Industrial

Comments:

Source: OSHA File 817

MACHINERY NOISE DATA SHEET

Industry: Fabricated Metal Products **SIC:** 34

Machine/Area: Grinding Area

Noise Level before Treatment: Unknown dbA

Noise Level after Treatment: Unchanged dbA

Cost of Treatment: $ Unknown

Treatment and Technology Used: Engineering Changes Did Not Result in Noise Reduction - Hearing Protection is Used

- **Materials:** Unknown
- **Design Practices:** Unknown
- **Analysis Techniques:** Unknown

Deleterious Effects of Treatment: Unknown

Measurement Techniques Used: Unknown

Sponsor of Work: Industrial

Comments:

Source: OSHA File 6-17-71

MACHINERY NOISE DATA SHEET

Industry: Fabricated Metal Products SIC: 34

Machine/Area: Pneumatic Grinder

Noise Level before Treatment: 105-107 dbA

Noise Level after Treatment: 89-91 dbA

Cost of Treatment: $ 25/Unit

Treatment and Technology Used: Enlarged Exhaust Orifice and Muffled Air Exhaust.

- Materials: Unknown
- Design Practices: Unknown
- Analysis Techniques: Unknown

Deleterious Effects of Treatment: None

Measurement Techniques Used: Unknown

Sponsor of Work: Industrial

Comments:

Source: OSHA File 2-75

MACHINERY NOISE DATA SHEET

Industry: Fabricated Metal Products SIC: 34

Machine/Area: Grinding, Shears, Fabricating Area

Noise Level before Treatment: 115 dbA

Noise Level after Treatment: dbA

Cost of Treatment: $

Treatment and Technology Used: None Yet

- Materials:
- Design Practices:
- Analysis Techniques:

Deleterious Effects of Treatment:

Measurement Techniques Used: DuPont Dosimeters

Sponsor of Work: Industrial

Comments:

Source: OSHA File 6-26-75

MACHINERY NOISE DATA SHEET

Industry: Fabricated Metal Products SIC: 34

Machine/Area: Hand Held Grinders

Noise Level before Treatment: 102-104 dbA At Grinding Station

Noise Level after Treatment: 85-87 dbA At Grinding Station

Cost of Treatment: $ Unknown

Treatment and Technology Used: Enclosed booth constructed of plywood and lined with 3/4" to 1" of acoustic material. Plexiglass door extends to within 4" to 5" of table. Opening is covered by a plastic or rubber material which is slotted for operator's arms and hands.

- Materials: Plywood, Plexiglass, 3/4" to 1" acoustic material
- Design Practices:
- Analysis Techniques:

Deleterious Effects of Treatment: Unknown

Measurement Techniques Used: Unknown

Sponsor of Work: Industrial

Comments:

Source: OSHA File 798

MACHINERY NOISE DATA SHEET

Industry: Fabricated Metal Products SIC: 34

Machine/Area: Weld Grinder

Noise Level before Treatment: 105 dbA At operators ear

Noise Level after Treatment: 91 dbA

Cost of Treatment: $ 1200/Unit

Treatment and Technology Used: Replaced angle Head Disc Grinder With Belt Sanders

- Materials:
- Design Practices:
- Analysis Techniques:

Deleterious Effects of Treatment: None

Measurement Technique Used: Unknown

Sponsor of Work: Industrial

Comments:

Source: OSHA File 766

MACHINERY NOISE DATA SHEET

Industry: Fabricated Metal Products SIC: 34

Machine/Area: Grinding and Gauging

Noise Level before Treatment: 105 to 110 dbA

Noise Level after Treatment: 85 dbA

Cost of Treatment: $ 11,000

Treatment and Technology Used: Replaced Grinding Operation With a Plate Planing Operation

- Materials:
- Design Practices:
- Analysis Techniques:

Deleterious Effects of Treatment: None

Measurement Techniques Used: Unknown

Sponsor of Work: Industrial

Comments:

Source: OSHA File 990

MACHINERY NOISE DATA SHEET

Industry: Fabricated Metal Products SIC: 34

Machine/Area: Wire Drawing - Insulating Machine

Noise Level before Treatment: 93 dbA } At Operator's ear

Noise Level after Treatment: 89 dbA

Cost of Treatment: $ 20,881/Unit

Treatment and Technology Used: (1) Enclosure of airwipes, motors and belts, (2) Isolation with sound absorbing materials, (3) Change from cog belts to V-belts, (4) Installation of plastic planetary gears and use of alternate plastic and steel gears.

- Materials: Soundcoat Panels (Polyurethane Sandwiched Between Sheets of Tedlar), Fiberglass and Sprayed mastic material
- Design Practices: Machine Redesign
- Analysis Techniques: Unknown

Deleterious Effects of Treatment: Unknown

Measurement Techniques Used: Unknown

Sponsor of Work: Industrial

Comments:

Source: OSHA File, April 1973

MACHINERY NOISE DATA SHEET

Industry: Fabricated Metal Products SIC: 34

Machine/Area: Wire and Cable Insulating Machine

Noise Level before Treatment: 101 dbA

Noise Level after Treatment: "Acceptable Levels dBA

Cost of Treatment: $ Unknown

Treatment and Technology Used: Raised Air Wiper Seals.

- Materials: Unknown
- Design Practices: Redesign
- Analysis Techniques: Unknown

Deleterious Effects of Treatment: Unknown (Probably None)

Measurement Techniques Used: Unknown

Sponsor of Work: Industrial

Comments:

Source: OSHA File 539

MACHINERY NOISE DATA SHEET

Industry: Fabricated Metal Products SIC: 34

Machine/Area: Cablemaking Machinery

Noise Level before Treatment: 103 dbA } At 1 meter
Noise Level after Treatment: 83 dbA

Cost of Treatment: $ Unknown

Treatment and Technology Used: Partial Enclosure and Design Practices.

- Materials: "Flexidur", Mineral - Wool
- Design Practices: Bearing (Selection of Antifriction or Journal pending on Speed) Gearing Design Practices, Cast vs Welded Construction
- Analysis Techniques: Empirical Spectrum Analysis Coupled With Design Practices

Deleterious Effects of Treatment: Added Heat in Enclosures, Added Noise Within Enclosures, Speed Reduction to Achieve Change (Reduction) in Noise.

Measurement Techniques Used: Spectrum Measurement

Sponsor of Work: Industrial

Comments: $\Delta L = 23 \log V_1/V_2$ (effect of speed on noise)

Source: W. Izert and H. Meurkamm, Noise Abatement of Cablemaking Machinery by Means of Design Analysis, Wire World International, January/February 1973

MACHINERY NOISE DATA SHEET

Industry: Fabricated Metal Products SIC: 34

Machine/Area: Braiding Machine

Noise Level before Treatment: 92-103 dbA

Noise Level after Treatment: 90 dbA

Cost of Treatment: $ Unknown

Treatment and Technology Used: Accoustical Enclosure

- Materials: Unknown
- Design Practices:
- Analysis Techniques:

Deleterious Effects of Treatment: Unknown

Measurement Techniques Used: Unknown

Sponsor of Work: Industrial

Comments:

Source: OSHA File 797 & 807

MACHINERY NOISE DATA SHEET

Industry: Fabricated Metal Products SIC: 34

Machine/Area: Scalding Machine

Noise Level before Treatment: 98 to 106 dbA

Noise Level after Treatment: Unknown dbA

Cost of Treatment: $ Unknown

Treatment and Technology Used: Accoustical Drapes, Sound Reducing Enclosures, Lug Padding, Isolation

- Materials: Unknown
- Design Practices: Unknown
- Analysis Techniques: Unknown

Deleterious Effects of Treatment: Unknown

Measurement Techniques Used: Unknown

Sponsor of Work: Industrial

Comments:

Source: OSHA File 317

MACHINERY NOISE DATA SHEET

Industry: Fabricated Metal Products SIC: 34

Machine/Area: Twisting Machine

Noise Level before Treatment: 92-101 dbA

Noise Level after Treatment: 90 dbA

Cost of Treatment: $ Unknown

Treatment and Technology Used: Acoustical Enclosure

- Materials: Unknown
- Design Practices: Unknown
- Analysis Techniques: Unknown

Deleterious Effects of Treatment: Unknown

Measurement Techniques Used: Unknown

Sponsor of Work: Industrial

Comments:

Source: OSHA File 797 & 807

Reproduced from best available copy.

MACHINERY NOISE DATA SHEET

Industry: Fabricated Metal Products **SIC:** 34

Machine/Area: Wire Twisting Machine

Noise Level before Treatment: 95 dbA } At Operator's ear

Noise Level after Treatment: 89 dbA

Cost of Treatment: $ 7300/Unit

Treatment and Technology Used: (1) Solid doors with rubber seals in each cabinet (2) Isolation of heads with soundcoat divider (3) Redesign of [illegible] bow to more efficient aerodynamic shape, (4) Magnetic stabilization [illegible] to eliminate gear train noise, (5) Exterior panels of soundcoat installed to isolate machines from each other.

- **Materials:** Soundcoat
- **Design Practices:** Redesign
- **Analysis Techniques:** Unknown

Deleterious Effects of Treatment: Unknown

Measurement Techniques Used: Unknown

Sponsor of Work: Industrial

Comments:

Source: OSHA File, April 1973

MACHINERY NOISE DATA SHEET

Industry: Fabricating Metal Products SIC: 34

Machine/Area: Metallizing Process

Noise Level before Treatment: 100-101 dbA At operator's ear

Noise Level after Treatment: 75 dbA Outside Enclosure

Cost of Treatment: $ 2500/Unit

Treatment and Technology Used: Enclosure

- Materials: Unknown
- Design Practices:
- Analysis Techniques:

Deleterious Effects of Treatment: Unknown

Measurement Techniques Used: Unknown

Sponsor of Work: Industrial

Comments:

Source: OSHA File 609

MACHINERY NOISE DATA SHEET

Industry: Fabricated Metal Products SIC: 34

Machine/Area: Plate Planer

Noise Level before Treatment: 105 to 110 dbA

Noise Level after Treatment: 85 dbA

Cost of Treatment: $ 15,000

Treatment and Technology Used: Replaced grinding and gouging operations with plate planer

- Materials:
- Design Practices: Replacement - Substitution
- Analysis Techniques:

Deleterious Effects of Treatment: Unknown

Measurement Techniques Used: Unknown

Sponsor of Work: Industrial

Comments:

Source: OSHA File 996

MACHINERY NOISE DATA SHEET

Industry: Fabricated Metal Products SIC: 34

Machine/Area: Milling Machine

Noise Level before Treatment: 118 dbA

Noise Level after Treatment: 106 dbA

Cost of Treatment: $ Unknown

Treatment and Technology Used: Damped Workpiece by Use of Soft Pine Blocks, Clamps and a Thin Elastomer Pad.

- Materials: Pine Wood and Elastomer Pad
- Design Practices: Shop Expediency
- Analysis Techniques: Unknown

Deleterious Effects of Treatment: 20 Percent Decrease in Productivity Because of Additional Setup Time

Measurement Techniques Used: Spectrum Analysis

Sponsor of Work: Industrial

Comments:

Source: NOISEXPO, National Noise and Vibration Control Conference, pp 157-161, September 11-13, 1973.

MACHINERY NOISE DATA SHEET

Industry: Fabricated Metal Products SIC: 34

Machine/Area: Milling Machine

Noise Level before Treatment: Unknown dbA

Noise Level after Treatment: Unknown dbA

Cost of Treatment: $ Unknown

Treatment and Technology Used: Damper on Milling Arbor

- Materials: Vibra-Damp Damper by Austin Tool Company
- Design Practices:
- Analysis Techniques:

Deleterious Effects of Treatment: None - Increased cutting speed by 13 percent and doubled tool life.

Measurement Techniques Used: Unknown

Sponsor of Work: Industrial

Comments: Applied to Large ([illegible] Inch) Cutter Which had Been Operating on a Heavy Duty Cycle.

Source: Taking Tool Chatter Out of Milling, Anona, Iron Age, November 13, [illegible]

MACHINERY NOISE DATA SHEET

Industry: Fabricated Metal Products SIC: 34

Machine/Area: Finishing Mills

Noise Level before Treatment: 95-104 dbA

Noise Level after Treatment: Unknown dbA

Cost of Treatment: $ Unknown

Treatment and Technology Used: Heavy Canvas Covers Fitted to Top and Side of Finishing Mills.

- Materials: Canvas
- Design Practices:
- Analysis Techniques:

Deleterious Effects of Treatment: Unknown

Measurement Techniques Used: Unknown

Sponsor of Work: Industrial

Comments:

Source: OSHA File [illegible]

MACHINERY NOISE DATA SHEET

Industry: Fabricated Metal Products SIC: 34

Machine/Area: Latho

Noise Level before Treatment: ________ dbA

Noise Level after Treatment: ________ dbA

Cost of Treatment: $________

Treatment and Technology Used: ________

- Materials: ________
- Design Practices: ________
- Analysis Techniques: ________

Deleterious Effects of Treatment: ________

Measurement Techniques Used: ________

Sponsor of Work: ________

Comments: Clinical Study of Effect of Lathe Results in Next Page
Health Effects

Source: Dumkina, G. Z. "Some Clinical Physiological Studies of Workers Undergoing the Effects of Continuous Noise" Occupational Hygiene and Occupational Diseases Vol. 10 No. 12, 1966

MEAN SENSITIVITY THRESHOLD (IN DB) FOR MANUAL AND AUTOMATIC LATHE OPERATORS RELATIVE TO LENGTH OF SERVICE

Service (in years)	Number of Observations	Noise frequency (Hz)								
		125	250	500	1000	2000	3000	4000	6000	8000
		Manual operators								
1--4	68	6.7	6.3	5.1	4.4	4.4	10.7	10.3	14.7	8.8
5--9	38	11	11.1	7.5	9.6	7.8	16.8	16.0	23.9	22.5
10 +	18	11.2	10.4	8.3	8.7	8.3	21.6	21.6	29.6	22.3
		Automatic operators								
1--4	56	6.9	6.3	4.8	5.4	5.2	15.3	15.0	15.2	8.0
5--9	20	11.0	10.5	9.0	9.0	9.0	22.0	25.5	26.0	19.5
10 +	16	14.4	15	16.2	13.7	15.6	25.6	34.4	38.1	31.2

MACHINERY NOISE DATA SHEET

Industry: Fabricating Metal Products SIC: 34

Machine/Area: Vertical Turret Lathe

Noise Level before Treatment: 111 dbA

Noise Level after Treatment: 101 dbA

Cost of Treatment: $

Treatment and Technology Used: Damped Tool Holder (A Layer of Elastic Damping Material Sandwiched Between Two Steel Plates)

- Materials: Unknown
- Design Practices: Unknown
- Analysis Techniques: Unknown

Deleterious Effects of Treatment: Unknown

Measurement Techniques Used: Spectrum Analysis

Sponsor of Work: Industrial

Comments:

Source: OSHA File #04

MACHINERY NOISE DATA SHEET

Industry: Fabricated Metal Products SIC: 34

Machine/Area: Three-Axis Vertical Turret Lathe

Noise Level before Treatment: 81 dbA

Noise Level after Treatment: 61 dbA

Cost of Treatment: $ Unknown

Treatment and Technology Used: Custom Designed Hydraulic Acoustic Filter

- Materials: Unknown
- Design Practices: Unknown
- Analysis Techniques: Unknown

Deleterious Effects of Treatment: Unknown

Measurement Techniques Used: Spectrum Analysis

Sponsor of Work: Industrial

Comments:

Source: OSHA File 610

MACHINERY NOISE DATA SHEET

Industry: Fabricated Metal Products SIC: 34

Machine/Area: Automatic Screw Machine

Noise Level before Treatment: 88 to 99 dbA Operator's Position

Noise Level after Treatment: 83 to 89 dbA

Cost of Treatment: $ Unknown

Treatment and Technology Used: Stock Tubes Strapped Together or Covered With Sound Deadening Material

- Materials: Unknown
- Design Practices: -
- Analysis Techniques: -

Deleterious Effects of Treatment: Unknown

Measurement Techniques Used: Unknown

Sponsor of Work: Industrial

Comments:

Source: OSHA File 109

MACHINERY NOISE DATA SHEET

Industry: Fabricated Metal Products SIC: 34

Machine/Area: Automatic Screw Machine

Noise Level before Treatment: 88 to 99 dbA

Noise Level after Treatment: Drop 5 to 10 dbA

Cost of Treatment: $ Unknown

Treatment and Technology Used: Stock Tube Inserts; Enclose Cutting Tools

- Materials: Unknown
- Design Practices: ?
- Analysis Techniques: ?

Deleterious Effects of Treatment: Unknown

Measurement Techniques Used: Accepted Practices - At Worker Hearing Zone Per Ind 11.03 and 11.06

Sponsor of Work: Industrial

Comments:

Source: Control of Hazardous Industrial Noise Exposures, DOL, OSHA; Contract No. 05-33-10-01-72

MACHINERY NOISE DATA SHEET

Industry: Fabricated Metal Products SIC: 34

Machine/Area: Automatic Five-Spindle Screw Machine (Davenport)

Noise Level before Treatment: 97 dbA

Noise Level after Treatment: 78 dbA

Cost of Treatment: $

Treatment and Technology Used: 1) Older Machines be Modernized to Incorporate Current Cabinet Base Before Installing Silencer 2) Modify Older Machine to Support the Hood. 3) Use of Enclosure 4) Neoprene Pad Under the Belt Cover Layer of Soundcoat Used With Layer of 16 Gauge Steel for Belt Guard

- Materials:
- Design Practices:
- Analysis Techniques:

Deleterious Effects of Treatment: None

Measurement Techniques Used:

Sponsor of Work: Industrial

Comments:

Source: Bourne, J. C. "Noise Control Hood for the Davenport Automatic" Sound and Vibration, Vol. 4 No. 11, 1970

MACHINERY NOISE DATA SHEET

Industry: Fabricated Metal Products SIC: 34

Machine/Area: Shaper

Noise Level before Treatment: 100-103 dbA

Noise Level after Treatment: 97-99 dbA

Cost of Treatment: $ 150/Unit

Treatment and Technology Used: Enclosure

- Materials: Plywood, Urethane Foam, Lead Sheets
- Design Practices: -
- Analysis Techniques: -

Deleterious Effects of Treatment: Unknown

Measurement Techniques Used: Unknown

Sponsor of Work: Industrial

Comments: Owner Working With Manufacturer to Get Cutting Head Design to Permit Slower Speed Operation

Source: OSHA File 777

MACHINERY NOISE DATA SHEET

Industry: Fabricated Metal Products SIC: 34

Machine/Area: Horizontal Boring Machine

Noise Level before Treatment: Unknown dbA

Noise Level after Treatment: Unknown dbA

Cost of Treatment: $ Unknown

Treatment and Technology Used: 1)Design Noise Out, 2)Enclose Noise Sourc
Shield Operator From Noise ● Hydraulic Power Supply was Redesigned b
Lower rpm Motor and Pump; Use of Flange Mounted Pump; Pump and Motor
Rubber Isolators; Use of Rubber Hose Sections; (continued on reverse s

- ● Materials: Foam Lead
- ● Design Practices: Redesign
- ● Analysis Techniques: Unknown

Deleterious Effects of Treatment: Higher Cost, Increase Maintenance

Measurement Techniques Used: Unknown

Sponsor of Work: Industrial

Comments:

Source: NOISEXPO, National Noise and Vibration Control Conference, pp 112-114, September 11-13, 1973.

Treatments and Technology Used Concluded.

Manifolding Pipes and Fittings; and Baffles Inside Reservoir No Data on Hydraulic Power Supply Noise Reduction - Initial Noise Level Was 90-98dBA.

- Bearing Noise Reduction From 90-92dBA to 82-85dBA By Honing Bearing Rollers After Grinding.
- Panels to Shield Adjacent Areas From a Noise Source Reduced Noise Levels By 7 to 9 dBA. Panels are Lined on the Inside With a Convoluted Foam Material 3 inches thick.
- Headstock Shielding Provided 3 to 5dBA Noise Reduction Shield is Heavy Gage Sheet Metal With a 3 inch Foam Lead Sandwich

MACHINERY NOISE DATA SHEET

Industry: Fabricated Metal Products **SIC:** 34

Machine/Area: Horizontal Boring Bar Machine

Noise Level before Treatment: 90-92 dbA

Noise Level after Treatment: 82-83 dbA

Cost of Treatment: $ Unknown

Treatment and Technology Used: 1) Reduced Pump and Motor Speed from 1800 to 1200 rpm, (2) Used Flange Mounted Pump, (3) Isolated Pump and Motor With Rubber, (4) Used Rubber Hose Sections on Pump Input and Output Sections (5) Used Aluminum Manifold for Mounting Valves and Controls (6) Added Baffles Inside Reservoir, 7) Honed Roller Bearings, (8) Installed Panels and Partial Enclosures

- Materials: Unknown (Specifics)
- Design Practices: Redesign
- Analysis Techniques: -

Deleterious Effects of Treatment: Unknown

Measurement Techniques Used: Unknown

Sponsor of Work: Industrial

Comments:

Source: OSHA File 113

MACHINERY NOISE DATA SHEET

Industry: Fabricating Metal Products SIC: 34

Machine/Area: Air Hammers (Chipping)

Noise Level before Treatment: 120 dbA

Noise Level after Treatment: 102-104 dbA

Cost of Treatment: $ Unknown

Treatment and Technology Used: Enclosure - 1 inch Thick Walls Packed With Glass Wool

- Materials: Inner Shell = 16 Gage Steel, Outer Shell = 10 Gage Steel Glass Wool, Rubber Seals
- Design Practices: -
- Analysis Techniques: -

Deleterious Effects of Treatment: Unknown

Measurement Techniques Used: Unknown

Sponsor of Work: Industrial

Comments:

Source: OSHA File 303

MACHINERY NOISE DATA SHEET

Industry: Primary Metal Industries SIC: 33

Machine/Area: Chipping Hammers

Noise Level before Treatment: 110-120 dbA

Noise Level after Treatment: 90-100 dbA

Cost of Treatment: $ Unknown

Treatment and Technology Used: Replaced Chipping Hammers With "Flame Washing" - An Acetylene Torch is Applied Obliquely to Rough Casting

- Materials: -
- Design Practices: Process Substitution
- Analysis Techniques: -

Deleterious Effects of Treatment: Unknown

Measurement Techniques Used: Unknown

Sponsor of Work: Industrial

Comments: Not Universally Applicable

Source: R. W. Webster, "Anti-Noise Ideas", Publication Unknown.

MACHINERY NOISE DATA SHEET

Industry: Fabricated Metal Products SIC: 34

Machine/Area: Chipping Tool

Noise Level before Treatment: [illegible] dbA

Noise Level after Treatment: 90 dbA

Cost of Treatment: $ 600/Unit

Treatment and Technology Used: Replaced Chipping Tool With Shear Cutter

- Materials: -
- Design Practices: -
- Analysis Techniques: -

Deleterious Effects of Treatment: None

Measurement Techniques Used: Unknown

Sponsor of Work: Industrial

Comments:

Source: OSHA File 843-5131

MACHINERY NOISE DATA SHEET

Industry: Fabricated Metal Products SIC: 34

Machine/Area: Chipping Operation

Noise Level before Treatment: 111 dbA

Noise Level after Treatment: Unknown dbA

Cost of Treatment: $ Unknown

Treatment and Technology Uses: 1)Changed in Grinding Operation 2) Noise Suppressant Material Installed Above Grinding Area, 3) Hearing Protection Equipment Used

- Materials: Unknown
- Design Practices: x
- Analysis Techniques: x

Deleterious Effects of Treatment: Unknown

Measurement Techniques Used: Unknown

Sponsor of Work: Industrial

Comments:

Source: OSHA File #1

MACHINERY NOISE DATA SHEET

Industry: Fabricated Metal Products SIC: 34

Machine/Area: Deburring Machine

Noise Level before Treatment: 108 dbA At Operator's Ear

Noise Level after Treatment: 85-92 dbA At Operator's Ear

Cost of Treatment: $ 1200/Unit

Treatment and Technology Used: 1)Foam Placed Inside the Machine's Sheet Metal Surface, 2)Accoustic Hood at Operator's Loading Station.

- Materials: Unknown
- Design Practices: Rework of Machine
- Analysis Techniques: Unknown

Deleterious Effects of Treatment: Unknown

Measurement Techniques Used: Unknown

Sponsor of Work: Industrial

Comments:

Source: OSHA File 787

MACHINERY NOISE DATA SHEET

Industry: Fabricated Metal Products SIC: 34

Machine/Area: Deburring Operation (NutPipe Reaming)

Noise Level before Treatment: 106-108 dbA

Noise Level after Treatment: 94-95 dbA

Cost of Treatment: $ 100/Unit

Treatment and Technology Used: Redesigned Sprockets

- Materials: -
- Design Practices: Redesign of Machine
- Analysis Techniques: Unknown

Deleterious Effects of Treatment: Unknown

Measurement Techniques Used: Unknown

Sponsor of Work: Industrial

Comments:

Source: OSHA File 678

MACHINERY NOISE DATA SHEET

Industry: Fabricated Metal Products SIC: 34

Machine/Area: Head Spinner

Noise Level before Treatment: 95 dbA At Operator's Ear

Noise Level after Treatment: 94* dbA

Cost of Treatment: $ Unknown

Treatment and Technology Used: New Cams Installed

- Materials: -
- Design Practices: Unknown
- Analysis Techniques: Unknown

Deleterious Effects of Treatment: Unknown

Measurement Techniques Used: Unknown

Sponsor of Work: Industrial

Comments:

Source: OSHA File 369-8181

*94dBA for 32 Percent of Cycle Time - 68 Percent Was Below 90dBA

MACHINERY NOISE DATA SHEET

Industry: Fabricated Metal Products SIC: 34

Machine Area: Perforator

Noise Level before Treatment: 98 dbA } At Operator's Ear

Noise Level after Treatment: 86 dbA }

Cost of Treatment: $ 530/Unit

Treatment and Technology Used: Enclosure

- Materials: Unknown
- Design Practices: Unknown
- Analysis Techniques: Unknown

Deleterious Effects of Treatment: Unknown

Measurement Techniques Used: Unknown

Sponsor of Work: Industrial

Comments:

Source: OSHA File 661

MACHINERY NOISE DATA SHEET

Industry: Fabricated Metal Products SIC: 34

Machine/Area: Blanking Presses

Noise Level before Treatment: 83-110 dbA

Noise Level after Treatment: See Table dbA

Cost of Treatment: $ Unknown

Treatment and Technology Used: See Table

- Materials: Unknown
- Design Practices: Subsystem Noise Reduction
- Analysis Techniques: Empirical

Deleterious Effects of Treatment: Unknown

Measurement Techniques Used: Spectrum Analysis

Sponsor of Work: Industrial

Comments:

Source: Possibilities for Noise Reduction on Mechanical Blanking Presses, Sheet Metal Industries, May 1973

Table. NOISE TREATMENT OPTIONS

Subsystem	Treatment	Reduction, dBA
Frame	Rigid, All Steel Weldment	Unknown
Clutch	Pneumatic or Hydraulic	Unknown
Ram	Damper for Punch Breakthrough	5
Press	Reduce Press Loading by one-half	6
Punch	Replace Single Shear With Double Shear	3-5
Die	Single Step to Multiple Step	5
Stripper Plate	Replace Metallic Plate With Plastic Plate	4
Workpiece Supply	Positive Guide To Coil Loop	10
Workpiece Discharge	Avoid Pneumatic Discharge	Unknown
Press	Enclosure	20 to 25

MACHINERY NOISE DATA SHEET

Industry: Fabricated Metal Products SIC: 34

Machine/Area: Shears

Noise Level before Treatment: 92 to 107 dbA

Noise Level after Treatment: Drop 9 to 15 dbA

Cost of Treatment: $ Unknown

Treatment and Technology Used: See Design Practices

- Materials: Unknown
- Design Practices: Cover Rollers With Deadening Sleeves and Fill Rollers With Damping Material.
- Analysis Techniques:

Deleterious Effects of Treatment:

Measurement Techniques Used: "Accepted Practices" - At Worker Hearing Zone Per Ind 11.03 and 11.06

Sponsor of Work: Industrial

Comments:

Source: Control of Hazardous Industrial Noise Exposures, DOL, OSHA; Contract No. 05-31-10-01-77.

MACHINERY NOISE DATA SHEET

Industry: Fabricated Metal Products SIC: 34

Machine/Area: Shear

Noise Level before Treatment: 95 dbA

Noise Level after Treatment: 80 dbA

Cost of Treatment: $Unknown

Treatment and Technology Used: Source Was Exhaust Mechanism and Air Noise. Four Air Silencers Were Installed

- Materials: Unknown
- Design Practices: Reduce Air Volume, Slow Discharge Velocity and Change Acoustic Frequency Through Redesign
- Analysis Techniques: Unknown

Deleterious Effects of Treatment: Unknown

Measurement Techniques Used: Unknown

Sponsor of Work: Industrial

Comments:

Source: OSHA File 800

MACHINERY NOISE DATA SHEET

Industry: Fabricated Metal Products SIC: 34

Machine/Area: Screwplate Press 200 Ton

Noise Level before Treatment: 95 dbA

Noise Level after Treatment: Unknown dbA

Cost of Treatment: $ Unknown

Treatment and Technology Used: Enclosure Made of Wood Walls 2 inches Thick Insulated With Fiberglass Material. Leaded Curtaining is Used Around Small Areas Involving Moving Parts of the Press.

- Materials: Unknown
- Design Practices: Unknown
- Analysis Techniques: Unknown

Deleterious Effects of Treatment: Unknown

Measurement Techniques Used: Unknown

Sponsor of Work: Industrial

Comments:

Source: OSHA File 536

MACHINERY NOISE DATA SHEET

Industry: Fabricated Metal Products SIC: 34

Machine/Area: Drop Forge or Hammering

Noise Level before Treatment: >100 dbA

Noise Level after Treatment: Unknown dbA

Cost of Treatment: $ Unknown

Treatment and Technology Used: Clampwork

- Materials: Unknown
- Design Practices:
- Analysis Techniques:

Deleterious Effects of Treatment: Unknown

Measurement Techniques Used: "Accepted Practices" - At Worker Hearing Zone Per Ind. 11.03 and 11.06

Sponsor of Work: Industrial

Comments:

Source: Control of Hazardous Industrial Noise Exposures, DOL, OSHA; Contract No. 05-33-10-01-72

MACHINERY NOISE DATA SHEET

Industry: Fabricating Metal Products SIC: 34

Machine/Area: Forging Machine

Noise Level before Treatment: 88 to 108 dbA

Noise Level after Treatment: Unknown dbA

Cost of Treatment: $ Unknown

Treatment and Technology Used: Blower Moved to Outside Location

- Materials: Unknown
- Design Practices: Unknown
- Analysis Techniques: Unknown

Deleterious Effects of Treatment: Unknown

Measurement Techniques Used: Unknown

Sponsor of Work: Industrial

Comments:

Source: OSHA File 321

MACHINERY NOISE DATA SHEET

Industry: Fabricated Metal Products SIC: 34

Machine/Case: Upset Forging Press

Noise Level before Treatment: 100 dbA

Noise Level after Treatment: 85 dbA

Cost of Treatment: $ Unknown

Treatment and Technology Used: Quieted High Pressure Water Cooled Hydr. Pumps and Lines. Pumps and Pipes Were Covered With 0.97 lb/ft² Leaded Vinyl With ½ inch Foam

- Materials: Leaded Vinyl and Foam
- Design Practices: Barrier
- Analysis Techniques: -

Deleterious Effects of Treatment: Unknown

Measurement Techniques Used: Unknown

Sponsor of Work: Industrial

Comments:

Source: OSHA File 662

MACHINERY NOISE DATA SHEET

Industry: Fabricated Metal Products SIC: 34

Machine/Area: 60 Ton Plate Pin Press

Noise Level before Treatment: 91-96 dbA

Noise Level after Treatment: 3-4 dB: dbA

Cost of Treatment: $

Treatment and Technology Used: Interposing a Resilient Material Between The Metal Contact Areas of the Traveling Stripper Pad and Stationary Pad Kipper.

- Materials: Urethane Rubber (Conathane RN-3001)
- Design Practices:
- Analysis Techniques:

Deleterious Effects of Treatment: None

Measurement Techniques Used: At Operator's Position

Sponsor of Work: Industrial

Comments:

Source: Rainey, J. T. "Evaluation of Noise Control Tech. for Quieting Plate Pin Presses" (Unpublished) Institute of Noise Control Engineering and Arden House Workshop, Harriman, New York 1973

MACHINERY NOISE DATA SHEET

Industry: Fabricated Metal Products SIC: 34

Machine/Area: Mechanical Power Press (20 Ton)

Noise Level before Treatment: 98 dbA } 6 ft From Machine

Noise Level after Treatment: 86 dbA }

Cost of Treatment: $ Unknown

Treatment and Technology Used: Enclosure 2x4 Frame; 1/4 inch Plywood Cover; Cutouts for Slide Feed, Finished Parts and Scrap; Louvers Were Cut in Top To Release Heat

- Materials: ½ inch of Foam, A Septum of 1 lb Sheet Lead, and A Layer of ½ inch Foam = Lining.
- Design Practices:
- Analysis Techniques:

Deleterious Effects of Treatment: Unknown

Measurement Techniques Used: Noise Measured 6 ft From Press (In Front and Behind)

Sponsor of Work:

Comments: Press Speed = 600 Strokes Per Minute; Louvers Were Baffled to Reduce Noise; Position of Baffles Made a "Great Difference" in the Noise Reduction

Source: Techniques for Reducing Machinery Noise, T. D. Agee, Pollution Engineering, September/October 1971.

MACHINERY NOISE DATA SHEET

Industry: Fabricated Metal Products SIC: 34

Machine/Area: Hydraulic Press (800 Ton)

Noise Level before Treatment: 100 dbA

Noise Level after Treatment: 94 dbA

Cost of Treatment: $Unknown

Treatment and Technology Used: Vibration Isolation and Damping Material on Outside of Handling Chutes.

- Materials: Unknown
- Design Practices:
- Analysis Techniques:

Deleterious Effects of Treatment: Unknown

Measurement Techniques Used: "Accepted Practices" - At Worker Hearing Zone Fix Ind 11.03 and 11.06

Sponsor of Work: Industrial

Comments:

Source: Control of Hazardous Industrial Noise Exposures, DOL, OSHA; Contract No. 05-55-10-01-77

MACHINERY NOISE DATA SHEET

Industry: Fabricated Metal Products SIC: 34

Machine/Area: Cold Header

Noise Level before Treatment: ________dbA

Noise Level after Treatment: ________dbA

Cost of Treatment: $________

Treatment and Technology Used: (1) Use Pressing Rather Than Impact (2) Blending Cam Curves and Reduce Peak Accel. (3) Resilient Material Betwe Die Mounting Block and Supporting Casting Surface and Ram and Header Too (4) Resilient Roller (5) Nylon Bushing Between Bearing and Casting.(Cont

- Materials:
- Design Practices:
- Analysis Techniques:

Deleterious Effects of Treatment:

Measurement Techniques Used:

Sponsor of Work: Industrial

Comments:

Source: Lampe, G. "Cold Header Noise Reduction" Proceedings of National Noise and Vibration Control Conference, Chicago, Illinois September 1973

Treatment and Technology Used Concluded:

(6) Isolate Machinery From Base Casting

(7) Isolate Base From Floor

(8) Treat Sheet Metal Guards and Doors With Damping Material

(9) Use of Plexiglas Where Inspection is Necessary

(10) Make Machine Easier to Remove From the Line of Inspection

MACHINERY NOISE DATA SHEET

Industry: Fabricated Metal Products SIC: 34

Machine/Area: Cold Heading (Boltmaker)

Noise Level before Treatment: 98 dbA

Noise Level after Treatment: 80 dbA

Cost of Treatment: $ Unkown

Treatment and Technology Used: Full Acoustical Cabinet

- Materials: Unknown
- Design Practices: Unknown
- Analysis Techniques: Unknown

Deleterious Effects of Treatment: Unknown

Measurement Techniques Used: Unknown

Sponsor of Work: Unknown

Comments:

Source: OSHA File 799

MACHINERY NOISE DATA SHEET

Industry: Fabricated Metal Products SIC: 34

Machine/Area: Cold Header

Noise Level before Treatment: 99 dbA

Noise Level after Treatment: 83 dbA

Cost of Treatment: $ Unknown

Treatment and Technology Used: Acoustically Treated Modular Guarding

- Materials: Unknown
- Design Practices: Unknown
- Analysis Techniques: Unknown

Deleterious Effects of Treatment: Unknown

Measurement Techniques Used: Unknown

Sponsor of Work: Industrial

Comments:

Source: OSHA File 789

MACHINERY NOISE DATA SHEET

Industry: Fabricated Metal Products SIC: 34

Machine/Area: Cold Heading

Noise Level before Treatment: 96-98 dbA

Noise Level after Treatment: <90 dbA

Cost of Treatment: $ 2000/Unit

Treatment and Technology Used: Complete Acoustical Cabinet

- Materials: Unknown
- Design Practices: Unknown
- Analysis Techniques: Unknown

Deleterious Effects of Treatment: Unknown

Measurement Techniques Used: Unknown

Sponsor of Work: Industrial

Comments:

Source: OSHA File 795

MACHINERY NOISE DATA SHEET

Industry: Fabricated Metal Products SIC: [illegible]

Machine/Area: 125 Ton Cold Header

Noise Level before Treatment: 107 dbA

Noise Level after Treatment: 82 dbA

Cost of Treatment: $

Treatment and Technology Used: Complete Enclosure for Cold Header

- Materials:
- Design Practices:
- Analysis Techniques:

Deleterious Effects of Treatment:

Measurement Techniques Used:

Sponsor of Work:

Comments:

Source: Wasserman, D. and Mitchel, J. "Noise Control for Punch Press and Cold Headers," Proceedings of National Noise and Vibration Control Conference, Chicago, Illinois, September 1974.

MACHINERY NOISE DATA SHEET

Industry: Fabricated Metal Products SIC: 34

Machine/Area: Orbital Forging

Noise Level before Treatment: Unknown dbA

Noise Level after Treatment: Unknown dbA

Cost of Treatment: $ Equipment Cost ~ ½ of Typical Forge

Treatment and Technology Used: The Upper Die is Inclined at a Slight An From Vertical and is Orbited Across the Top Surface of the Workpie At the Same Time, the Workpiece and the Lower Die, Which is Powere Hydraulic Ram, Move Upward Against the Orbiting Upper Die.

- Materials: -
- Design Practices: New Equipment Concept
- Analysis Techniques: -

Deleterious Effects of Treatment: Requires 10 to 40 seconds Per Piece as Compared to a Few Seconds Per Piece With Impact Forging.

Measurement Techniques Used: -

Sponsor of Work: Industrial

Comments: Orbital Forging Requires ~ 10 percent of the Pressure of Cold-Forming by Impact Forging; Currently Limited to Small Parts <4 inch Diameter.

Source: Noiseless Cold Forging, D. R. Dreger, Machine Design, pp 107-109 January 10, 1974

MACHINERY NOISE DATA SHEET

Industry: Fabricated Metal Products SIC: 34

Machine/Area: Staple Forming Machine

Noise Level before Treatment: 99-103 dbA

Noise Level after Treatment: 78-92 dbA

Cost of Treatment: $ 15,000/Unit

Treatment and Technology Used: Acoustical Insulation in Room

- Materials: Unknown
- Design Practices: Unknown
- Analysis Techniques: Unknown

Deleterious Effects of Treatment: Unknown

Measurement Techniques Used: Unknown

Sponsor of Work: Industrial.

Comments:

Source: OSHA File 720

MACHINERY NOISE DATA SHEET

Industry: Fabricated Metal Products SIC: 34

Machine/Area: Swager

Noise Level before Treatment: 108-116 dbA

Noise Level after Treatment: 88-112 dbA

Cost of Treatment: $9000/Unit

Treatment and Technology Used: Total Acoustical Enclosure

- Materials: Unknown
- Design Practices: Engineering Investigation
- Analysis Techniques: Unknown

Deleterious Effects of Treatment: Unknown

Measurement Techniques Used: Unknown

Sponsor of Work: Industrial

Comments:

Source: OSHA File 641

MACHINERY NOISE DATA SHEET

Industry: Fabricated Metal Products SIC:

Machine/Area: Stamping Press

Noise Level before Treatment: 98-100 dbA } 12 ft from Machine

Noise Level after Treatment: 91 dbA

Cost of Treatment: $ Unknown

Treatment and Technology Used: Modified Dies to a Three-Step Cu[illegible]ling Operation and Replaced Thin, Spring-Supported Stripper Plate With a Heavier Elastomer Cushioned Plate.

- Materials: Unknown
- Design Practices: Redesign
- Analysis Techniques: Unknown

Deleterious Effects of Treatment: Unknown

Measurement Techniques Used: Unknown

Sponsor of Work: Industrial

Comments:

Source: NOISEXPO, National Noise and Vibration Control Conference, September 11-13, 1973, pp 137-163

MACHINERY NOISE DATA SHEET

Industry: Fabricated Metal Products SIC: 34

Machine/Area: Punch Presses

Noise Level before Treatment: ~106 dbA

Noise Level after Treatment: Unknown dbA

Cost of Treatment: $ Unknown

Treatment and Technology Used: See Design Practices

- Materials:

- Design Practices: Substitute Mechanical Parts Ejection for Air, Cycle Air Ejection, Make Nozzle Part of Die, Add Flow Through Muffler to Ejection Add Cushioning Under Die Block, Enclose Die Area

Deleterious Effects of Treatment: Unknown

Measurement Techniques Used: "Accepted Practices" - At Worker Hearing Zone Per Ind 11.03 and 11.08

Sponsor of Work: Unknown

Comments:

Source: Control of Hazardous Industrial Noise Exposures, DOL, OSHA; Contract No. 05-55-10-01-72

MACHINERY NOISE DATA SHEET

Industry: Fabricated Metal Products SIC: [illegible]

Machine/Area: Punch Press

Noise Level before Treatment: Unknown dbA

Noise Level after Treatment: [illegible] dbA

Cost of Treatment: $Unknown

Treatment and Technology Used: Leaded Vinyl Added to Inside of Covers That Fit Over the Die Head Area. Feed and Takeoff Openings Were Reduced in Area.

- Materials: Leaded Vinyl
- Design Practices: Identified Sources as Pipework, Shakers, Hydraulic System and Gear Noise.
- Analysis Techniques: Unknown

Deleterious Effects of Treatment: Unknown

Measurement Techniques Used: "Accepted Practices" - At Worker Hearing Zone Per Ind 11.03 and 11.06

Sponsor of Work: Industrial

Comments:

Source: Control of Hazardous Industrial Noise Exposures, DOL, OSHA; Contract No. 05-55-10-01-73

MACHINERY NOISE DATA SHEET

Industry: Fabricated Metal Products SIC: 34

Machine/Area: Lamination Press (Punch Press)

Noise Level before Treatment: 97 dbA

Noise Level after Treatment: 81 dbA

Cost of Treatment: $ 3000

Treatment and Technology Used: Complete Enclosure With Vent to Outside

- Materials: "16 Gage Stainless Steel Filled With Viscoelastic Damping Compound, Double Glazed Safety Glass in Rubber Molding
- Design Practices: Enclosure Design
- Analysis Techniques: None

Deleterious Effects of Treatment: Unknown

Measurement Techniques Used: "Accepted Practices" - At Worker Hearing Zone Per Ind 11.03 and 11.06

Sponsor of Work: Manufacturer

Comments: Rate = 150 Strokes/Min., Panels Were Manufactured By Industrial Acoustics Company, Inc.

Source: Control of Hazardous Industrial Noise Exposures, DOL, OSHA; Contract No. 05-55-10-01-72

MACHINERY NOISE DATA SHEET

Industry: Fabricated Metal Products SIC: 34

Machine/Area: Punch Presses

Noise Level before Treatment: ______ dbA

Noise Level after Treatment: ______ dbA

Cost of Treatment: $______

Treatment and Technology Used: (1) Increase Overall Absorption & Decrease Reverberant (2) Partial Enclosure (3) Complete Enclosure (4) Redesign of Machine

Materials:

Design Practices: (1) Changing the Forces Generated by Machine Operation Which are Significant in Generating Noise (2) Eliminating Force Transmission to Radiating Surfaces (3) Reducing the Vibration and Noise Radiation Capability of Machine Element by Proper Damping and Decoupling With Air

- Analysis Techniques: (1) Waveform Analysis (2) Frequency Analysis (3) Frequency-time Analysis (4) Correlational Analysis

Deleterious Effects of Treatment:

Measurement Techniques Used:

Sponsor of Work:

Comments: Punch Press Noise Problems in General

Source: Shinaishin, O. A., "Sources and Control of Noise in Punch Presses" Proceedings of Short Courses Purdue Univ. May 1974

MACHINERY NOISE DATA SHEET

Industry: Fabricated Metal Products **SIC:** 34

Machine/Area: Punch Press

Noise Level before Treatment: 98 dbA } 20 ft from Press

Noise Level after Treatment: 71 dbA }

Cost of Treatment: $ Unknown

Treatment and Technology Used: 1)Punch Press Mounted on Channel-type Rubb Isolators, (2) Complete Enclosure, (3) Resilient Seal at Stock Entrance (Sealed Access Panels, (5) Lined Duct and Blower for Ventilation

- **Materials:** Unknown
- **Design Practices:** -
- **Analysis Techniques:** -

Deleterious Effects of Treatment: Unknown

Measurement Techniques Used: Unknown

Sponsor of Work: Industrial

Comments:

Source: Noise Control of Metal Stamping Operations, Sound and Vibratio November 1971,

MACHINERY NOISE DATA SHEET

Industry: Fabricated Metal Products SIC: 34

Machine/Area: Punch Press - 30 Ton With Automatic Feed

Noise Level before Treatment: 95 dbA At 1 Meter

Noise Level after Treatment: 82 dbA

Cost of Treatment: $ Unknown

Treatment and Technology Used: Small Enclosure Surrounding the Dies, the Ram, The Cross-Feed, the Delivery Chute and a Short Section of the Feed Plate.

- Materials: Steel, Gaskets and 1 inch of Polyurethane Foam on all Available Inside Surfaces.
- Design Practices: -
- Analysis Techniques: Noise Sources Isolation and Empirical Treatment

Deleterious Effects of Treatment: No Impact on Production Rate

Measurement Techniques Used: SPL Spectrum

Sponsor of Work: Unknown

Major Noise Sources:

- Impacts Associated With Die Operation
- Turbulence Noise Due to Air Ejection
- Metal to Metal Impacts of Parts Entering or Leaving the Press
- Stop and Start Impacts of Automatic Feed Mechanisms
- Vibration of the Surfaces of the Press Itself
- Vibration of the Flywheel Guard and Other Sheet Metal Parts Fastened to the Press.
- Vibration of the Sheet Metal Stock Being Fed to the Press
- Clutch and Brake Mechanisms on the Drive Shaft

Source: C. H. Allen and R. C. Ison, A Practical Approach to Punch Press Quieting, Noise Control Engineering, July-August 1974

MACHINERY NOISE DATA SHEET

Industry: Fabricated Metal Products SIC: 34

Machine/Area: Punch Press

Noise Level before Treatment: 90 dbA
Noise Level after Treatment: 85 dbA
} 6 ft from Press

Cost of Treatment: $ Unknown

Treatment and Technology Used: Enclosure - 2x4 inch Wood Frame Covered With 3/4 inch Plywood. Lined With Polyurethane Foam/Acoustic Lead/Polyurethane Foam Bonded to Plywood; Top Louvered to Dissipate Heat

- Materials: See Treatment
- Design Practices: -
- Analysis Techniques: -

Deleterious Effects of Treatment: Unknown

Measurement Techniques Used: Unknown

Sponsor of Work: Industrial

Comments:

Source: Use of Lead to Sound Insulate Sheet Metal Structures, Sheet Metal Industries, May 1973

MACHINERY NOISE DATA SHEET

Industry: Fabricated Metal Products SIC: 34

Machine/Area: Puster Press

Noise Level before Treatment: 113 dbA

Noise Level after Treatment: 95 dbA

Cost of Treatment: $ Unknown

Treatment and Technology Used: (1) Damp Noise of Finished Parts By Using a Sound Deadening Material Under the Pan, (2) Removing Nozzle.

- Materials: Unknown
- Design Practices: Unknown
- Analysis Techniques: Unknown

Deleterious Effects of Treatment: Unknown

Measurement Techniques Used: Unknown

Sponsor of Work: Industrial

Comments:

Source: OSHA File 811

MACHINERY NOISE DATA SHEET

Industry: Fabricated Metal Products SIC: 34

Machine/Area: Punch Press - 60 ton

Noise Level before Treatment: 103 dbA

Noise Level after Treatment: 83 dbA

Cost of Treatment: $ Unknown

Treatment and Technology Used: Enclosure With Walls 4 Inches Thick - Galvanized Steel Facing, Filled With Fibrous Glass Or Mineral Wool

- Materials: Fibrous Glass, Mineral Wool
- Design Practices:
- Analysis Techniques: Unknown

Deleterious Effects of Treatment: Unknown

Measurement Techniques Used: Unknown

Sponsor of Work: Industrial

Comments:

Source: OSHA File 488-8801

MACHINERY NOISE DATA SHEET

Industry: Fabricated Metal Products SIC: 34

Machine/Area: Punch Press

Noise Level before Treatment: 114 dbA } At Operator's Ear
Noise Level after Treatment: 86 dbA }

Cost of Treatment: $ 270/Unit

Treatment and Technology Used: Sound Absorbing Enclosure

- Materials: Unknown
- Design Practices: Unknown
- Analysis Techniques: Unknown

Deleterious Effects of Treatment: Unknown

Measurement Techniques Used: Unknown

Sponsor of Work: Industrial

Comments:

Source: OSHA File 654

MACHINERY NOISE DATA SHEET

Industry: Fabricated Metal Products SIC: 34

Machine/Area: Punch Press

Noise Level before Treatment: 93 dbA

Noise Level after Treatment: 80 dbA

Cost of Treatment: $ Unknown

Treatment and Technology Used: Partial Enclosure Plus Rubber Isolators

- Materials: Unknown
- Design Practices: Unknown
- Analysis Techniques: Unknown

Deleterious Effects of Treatment:

Measurement Techniques Used: Spectrum Analysis

Sponsor of Work: Industrial

Comments:

Source: OSHA File 663

MACHINERY NOISE DATA SHEET

Industry: Fabricated Metal Products SIC: 34

Machine/Area: Punch Press

Noise Level before Treatment: 99 dbA } 3 ft

Noise Level after Treatment: 87 dbA }

Cost of Treatment: $ 160/Unit

Treatment and Technology Used: Enclosure

- Materials: Unknown
- Design Practices: Unknown
- Analysis Techniques: Unknown

Deleterious Effects of Treatment: Unknown

Measurement Techniques Used: Unknown

Sponsor of Work: Industrial

Comments:

Source: OSHA File 508

MACHINERY NOISE DATA SHEET

Industry: Fabricated Metal Products SIC: 34

Machine/Area: Punch Press - 125 Ton

Noise Level before Treatment: 97 dbA } At Operator's Station

Noise Level after Treatment: 89 dbA }

Cost of Treatment: $ Unknown

Treatment and Technology Used: Four Sided "Enclosure" Without the Roof

- Materials: 4 inch Thick IAC Noishield Panels, Fibrous Acoustic Material, Windows
- Design Practices: Rework
- Analysis Techniques: Unknown

Deleterious Effects of Treatment: Unknown

Measurement Techniques Used: Unknown

Sponsor of Work: Industrial

Comments:

Source: OSHA File 633

MACHINERY NOISE DATA SHEET

Industry: Fabricated Metal Products SIC: 34

Machine/Area: Punch Press

Noise Level before Treatment: 95 dbA

Noise Level after Treatment: Unknown dbA

Cost of Treatment: $ Unknown

Treatment and Technology Used: 1) Vibration Isolation Mounts, 2) Lead - Vinyl Enclosure (3) Apply Damping Material to Sheet Metal

- Materials: Lead-Vinyl
- Design Practices: Rework
- Analysis Techniques: Unknown

Deleterious Effects of Treatment: Unknown

Measurement Techniques Used: Unknown

Sponsor of Work: Industrial

Comments:

Source: OSHA File 040

MACHINERY NOISE DATA SHEET

Industry: Fabricated Metal Products SIC: 34

Machine/Area: 125 Ton Punch Press

Noise Level before Treatment: 97 dbA

Noise Level after Treatment: 89 dbA

Cost of Treatment: $

Treatment and Technology Used: (1) Enclosure Without Roof for Punch Press.

- Materials:
- Design Practices:
- Analysis Techniques:

Deleterious Effects of Treatment:

Measurement Techniques Used:

Sponsor of Work: Industrial

Comments:

Source: Wasserman, D. & Mitchel, J. "Noise Control for Punch Press and Cold Headers" Proceedings of National Noise and Vibration Control Conference, September 1974, Chicago, Illinois.

MACHINERY NOISE DATA SHEET

Industry: Fabricated Metal Products SIC: 34

Machine/Area: Riveting - Orbital & Radial Heading

Noise Level before Treatment: 45-55 dbA

Noise Level after Treament: dbA

Cost of Treatment: $ Unknown

Treatment and Technology Used: Radial and Orbital Riveting Use the Wobbling Motion of the Tool to Deform the Rivet.

- Materials: -
- Design Practices: New Tool Concept
- Analysis Techniques: -

Deleterious Effects of Treament: Unknown

Measurement Techniques Used: Unknown

Sponsor of Work: Industrial

Comments: An Average Head is Formed in ½ sec. Downward Pressure is 10 percent of That Required to Impact - Form a head of a Given Size in a Given Material.

Source: Riveting the Noiseless Way, Machine Design, June 28, 1973

MACHINERY NOISE DATA SHEET

Industry: Fabricated Metal Products SIC: 34

Machine/Area: Riveting

Noise Level before Treatment: 116 to 126 dbA

Noise Level after Treatment: Unknown dbA

Cost of Treatment: $ Unknown

Treatment and Technology Used: Switch to Welding Process; Use Hearing Protection; Use Pneumatic Squeeze Riveters

- Materials: -
- Design Practices: -
- Analysis Techniques: -

Deleterious Effects of Treatment: Unknown

Measurement Techniques Used: "Accepted Practices" - At Worker Hearing Zone Per Ind 11.03 and 11.06.

Sponsor of Work: Unknown

Comments:

Source: Control of Hazardous Industrial Noise Exposure, DOL, OSHA; Contract No. 03-33-10-01-72

MACHINERY NOISE DATA SHEET

Industry: Fabricated Metal Products (automobile mfr) SIC: 34

Machine/Area: Cylinder Head Broaching Area

Noise Level before Treatment: ______ dbA

Noise Level after Treatment: 86 dbA

Cost of Treatment: $______

Treatment and Technology Used: 1)Foam lined sheet metal housing, completely enclosing the machine area 2) dummy ram extensions to plug end openings in the enclosure 3) second backwall on the machine bed 4) completely enclosed and mounted at the rear of the machine

- Materials: ______
- Design Practices: ______
- Analysis Techniques: ______

Deleterious Effects of Treatment: ______

Measurement Techniques Used: ______

Sponsor of Work: Industrial

Comments: ______

Source: Anon, "Noise Problem Conquered" Production January 1974

MACHINERY NOISE DATA SHEET

Industry: Fabricated Metal Products SIC: 34

Machine/Area: Magazine Bar Feed Machine

Noise Level before Treatment: 94 max dbA

Noise Level after Treatment: ______ dbA

Cost of Treatment: $______

Treatment and Technology Used: Triple wall carton lined with open cell acoustic foam

- Materials:
- Design Practices:
- Analysis Techniques:

Deleterious Effects of Treatment:

Measurement Techniques Used: 36 inches from machine spindle

Sponsor of Work: Industrial

Comments:

Source: Anon., "Liner Offers Answer to Bar Feed Noise" Automatic Machining, November 1974

MACHINERY NOISE DATA SHEET

Industry: Fabricated Metal Products SIC: 34

Machine/Area: Vibratory Feeder

Noise Level before Treatment: 100 dbA
Noise Level after Treatment: 97.5 dbA
} operator station

Cost of Treatment: $

Treatment and Technology Used: Polyurethane interior lining

- Materials: Polyurethane
- Design Practices: rework
- Analysis Techniques: unknown

Deleterious Effects of Treatment: none

Measurement Techniques Used: unknown

Sponsor of Work: Industrial

Comments: Vibrator noise level is 65dBA without parts - noise is due to parts banging against parts

Source: Taming Noisy Feeders, Automation, July 1971

MACHINERY NOISE DATA SHEET

Industry: Fabricated Metal Products SIC: 34

Machine/Area: Centrifuge

Noise Level before Treatment: 102 dbA

Noise Level after Treatment: 92 dbA

Cost of Treatment: $ unknown

Treatment and Technology Used: Replaced wire scrapers with teflon coated machine

- Materials: teflon
- Design Practices: redesign
- Analysis Techniques: unknown

Deleterious Effects of Treatment: unknown

Measurement Techniques Used: Spectrum analysis

Sponsor of Work: Industrial

Comments:

Source: OSHA File 324

MACHINERY NOISE DATA SHEET

Industry: Fabricated Metal Products SIC: 34

Machine/Area: Vibrator

Noise Level before Treatment: 106 dbA

Noise Level after Treatment: unknown dbA

Cost of Treatment: $ unknown

Treatment and Technology Used: Enclosure reduced noise 95 percent

- Materials: 18 gage steel sheets lined with 22 gage perforated steel sheets. Walls are packed with acoustic thermal fill
- Design Practices:
- Analysis Techniques: unknown

Deleterious Effects of Treatment: unknown

Measurement Techniques Used: unknown

Sponsor of Work: Industrial

Comments:

Source: OSHA File 762

MACHINERY NOISE DATA SHEET

Industry: Fabricated Metal Products SIC: 34

Machine/Area: Industrial Vacuum

Noise Level before Treatment: 102-110 dbA 10 ft

Noise Level after Treatment: 78-86 dbA

Cost of Treatment: $ 5/Unit

Treatment and Technology Used: Glass Packed Dissipative Automobile Muffler

- Materials: Unknown
- Design Practices: Redesign
- Analysis Techniques: Unknown

Deleterious Effects of Treatment: Muffler Replacement After 240 Hours of Use

Measurement Techniques Used: Unknown

Sponsor of Work: Industrial

Comments:

Source: OSHA File 747

MACHINERY NOISE DATA SHEET

Industry: Fabricated Metal Products SIC: 34

Machine/Area: Propeller, Compressor, and Pump

Noise Level before Treatment: ________ dbA

Noise Level after Treatment: ________ dbA

Cost of Treatment: $ ________

Treatment and Technology Used: (1) Lowest Practical Tip Wide Blade, Large Diameter and at Least 3-5 Blades for Propeller Inlet (2) Mach No. is Systematically Increased - Compressor (1) Avoid Sharp Bend, Rapid Change in Sectional Area, Highly Turbulent Flow for Pump

- Materials:
- Design Practices:
- Analysis Techniques:

Deleterious Effects of Treatment:

Measurement Techniques Used:

Sponsor of Work: Industrial

Comments:

Source: Foster, G. R. & Sanerian, G. "Noise From Propeller, Compressor and Pumps" 6th Institute on Noise Control Engineering, Clearwater Florida, February 1977.

MACHINERY NOISE DATA SHEET

Industry: Fabricated Metal Products SIC: 34

Machine/Area: Compressor, Pump, Air-Cooled-Heat-Exchanger

Noise Level before Treatment: ________ dbA

Noise Level after Treatment: ________ dbA

Cost of Treatment: $________

Treatment and Technology Used: Compressor (1) Utilization of Good Gears (2) Use of Direct Line Seal (3) Selection of Cast Iron (4) Minimize Radiating Surface (5) Selection of Proper Accessories.

Pump (1) Use of Pivoted Pad Radial Bearing (2) Use Multivaned Impeller. (3) Use Muffler on Exhaust.

Heat Exchanger (1) Reduce Fan Speed & hp (2) Increase Airflow in Surface Area (3) Sound Absorption Inside (4) Damping of Panel Vibration (5) Use of Patent Blade Tip.

Deleterious Effects of Treatment: ________

Measurement Techniques Used: ________

Sponsor of Work: Industrial

Comments: ________

Source: L. S. Goodfriend Associates "Noise Abatement Technology at the Manufacturer's Level", Noise From Industrial Plants. NTIS, 1971

MACHINERY NOISE DATA SHEET

Industry: Fabricated Metal Products SIC: 34

Machine/Area: Portable Compressor

Noise Level before Treatment: 110 dbA

Noise Level after Treatment: 83 dbA

Cost of Treatment: $

Treatment and Technology Used: Enclosed Compressor With Fiberglass Airfoil Blades

- Materials:
- Design Practices:
- Analysis Techniques:

Deleterious Effects of Treatment:

Measurement Techniques Used:

Sponsor of Work: Industrial

Comments:

Source: Diehl, G. M. "Built-in Sound Reduction" National Safety News June 1970

MACHINERY NOISE DATA SHEET

Industry: Fabricated Metal Products SIC: 34

Machine/Area: Mobile Compressor

Noise Level before Treatment: ________dbA

Noise Level after Treatment: ________dbA

Cost of Treatment: $________

Treatment and Technology Used:

- Materials: Muffler (Sound Muffling Data for Various Materials, See Next Page)
- Design Practices:
- Analysis Techniques:

Deleterious Effects of Treatment:

Measurement Techniques Used:

Sponsor of Work: Industrial

Comments:

Source: Hergaarf, P. "State of Dev. of Noise Mufflers for Compressors Part 2" Noise Control Vol. 18 No. 2 1971 (In German)

VARIOUS MATERIALS AND THEIR AVERAGE SOUND-MUFFLING RATE (Rm)

Materials	G (kg/sq m)	Rm (dB)
12 cm non-plastered concrete	280.0	54
12 cm non-plastered concrete	460.0	58
15 cm non-plastered brick	290.0	45
28 cm brick	530.0	51
7 cm hollow glass stone	80.0	36
8 cm hard filament plate	7.5	28
3.5 mm contruction glass	9.5	27
1 mm sheet steel	8.0	26

MACHINERY NOISE DATA SHEET

Industry: Fabricated Metal Products SIC: 34

Machine/Area: Compressor

Noise Level before Treatment: ______ dbA

Noise Level after Treatment: ______ dbA

Cost of Treatment: $______

Treatment and Technology Used: (1) Muffler for IntakePulsation (12 dB) (2) Block or Compact Building Method Against Vibration Tranfer (3) Obligatory Recooler for Exhaust Noise Muffler (4) Sound-Absorbing Hood for Compressor (27 dB)

- Materials:
- Design Practices:
- Analysis Techniques:

Deleterious Effects of Treatment:

Measurement Techniques Used:

Sponsor of Work: Industrial

Comments:

Source: Marggraf, D. "State of Devlopement of Noise-Damped Compressors Part 1" Kampf dem Laern

MACHINERY NOISE DATA SHEET

Industry: Fabricated Metal Products SIC: 34

Machine/Area: Centrifugal Compressor

Noise Level before Treatment: ______ dbA

Noise Level after Treatment: ______ dbA

Cost of Treatment: $______

Treatment and Technology Used: (1) Insulate All Compressed Air Piping in Compressor Room (2) Lined Enclosure Over Pump (3) Insulate Walls of Compressor Room (4) Muffler for Discharging High Pressure.

- Materials:
- Design Practices:
- Analysis Techniques.

Deleterious Effects of Treatment:

Measurement Techniques Used:

Sponsor of Work: Industrial.

Comments:

Source: Quinn, T. J. "Recommendations for Controlling Centrifugal Compressor Noise" Plant Engineering, April 1973.

MACHINERY NOISE DATA SHEET

Industry: Fabricated Metal Products SIC: 34

Machine/Area: Centrifugal Compressor

Noise Level before Treatment: ______ dbA

Noise Level after Treatment: ______ dbA

Cost of Treatment: $______

Treatment and Technology Used: (1) Increasing Blade Passing Frequency and Radial Distance Between Blade (2) Sound Absorption, (3) Isolation (4) Vibration Isolation (5) Vibration Damping (6) Muffling (7) Enclosure

- Materials: Fiberglass, Rock Wool, Ultracoustic
- Design Practices: ______
- Analysis Techniques: ______

Deleterious Effects of Treatment: ______

Measurement Techniques Used: ______

Sponsor of Work: Industrial

Sources of Noise: (1) Driving Engine
(2) Cooling Fan

Source: Diehl, G. M. "Centrifugal Compressor Noise Reduction" Proceedings of Short Courses, Purdue Univ. May 1974

MACHINERY NOISE DATA SHEET

Industry: Fabricated Metal Products SIC: 34

Machine/Area: Shot Blasting

Noise Level before Treatment: 90 to 95 dbA

Noise Level after Treatment: Unknown dbA

Cost of Treatment: $ Unknown

Treatment and Technology Used:

- Materials:
- Design Practices: Replace Air Powered Shot Removal With Brushes
- Analysis Techniques:

Deleterious Effects of Treatment:

Measurement Techniques Used: "Accepted Practices" - At Worker Hearing Zone Per Ind 11.03 and 11.06

Sponsor of Work: Industrial

Comments:

Source: Control of Hazardous Industrial Noise Exposures, DOL, OSHA; Contract No. 05-55-10-01-73

MACHINERY NOISE DATA SHEET

Industry: Fabricated Metal Products SIC: 34

Machine/Area: Radial Ball or Roller Bearings

Noise Level before Treatment: ______ dbA

Noise Level after Treatment: ______ dbA

Cost of Treatment: $______

Treatment and Technology Used: ______

- Materials: ______
- Design Practices: ______
- Analysis Techniques: ______

Deleterious Effects of Treatment: Changes in the Spectrum Were More Evident Than Change in Total Noise and Vibration Level.

Measurement Techniques Used: Use of Microphone Accelerometer and Spectrometer.

Sponsor of Work: ______

Study on (1) Anal. Noise Vibration Interdependence for Free Bearing (2) Anal. the Influence of Cage Material, No. of Rot. Per Min. and Load Characteristics of Noise an Vibration Frequency Spectrogram (3) Elucidate Specific Aspect of Noise Spectrogram for Bearings With Same Standard Dimension

Source:

Gafiteanu, M. D. et al. "Contributions to the Study of Characteristics of Bearing Noise and Vibration" Proceedings of 5th National Conference on Acoustics Vol 1A. Bucharest, May 1973

MACHINERY NOISE DATA SHEET

Industry: Fabricated Metal Products SIC: 34

Machine/Area: Enclosed Gear Drive

Noise Level before Treatment: ____________dbA

Noise Level after Treatment: ____________dbA

Cost of Treatment: $____________

Treatment and Technology Used: ____________

- Materials: ____________
- Design Practices: ____________
- Analysis Techniques: ____________

Deleterious Effects of Treatment: ____________

Measurement Techniques Used: ____________

Sponsor of Work: ____________

Cause of Noise (1) Impulse of Meshing Teeth
(2) Friction of Meshing Teeth (5) Excited Gear Blanks
(3) Vibration of Gear Blanks
(4) Dynamic Forces of Meshing Gear Teeth

Source: Wellauer, E. J. and Schunck, R. A. "Gear Unit Sound Generation Transmission, Control and Speification" Tappi Vol. 56 No. 6, 1973

MACHINERY NOISE DATA SHEET

Industry: Fabricated Metal Products SIC: 34

Machine/Area: Gears

Noise Level before Treatment: ______ dbA

Noise Level after Treatment: ______ dbA

Cost of Treatment: $______

Treatment and Technology Used: Parallel Shaft Gears Rather Than Right Angle and Cross-Axis Gearing. Helical Rather Than Spur Gears (12 dB). High Viscosity Lub. Oil. Avoid Thin Plates for Damping. Vibration Isolating Material Under Gear Box.

- Materials:
- Design Practices:
- Analysis Techniques:

Deleterious Effects of Treatment: More Durable

Measurement Techniques Used:

Sponsor of Work: Philadelphia Gear Corp. King of Prussia, Pa.

Comments:

Source: Bradley, W. A. "How to Design Noise Out of Gears", Machine Design Vol. 45, 1973

MACHINERY NOISE DATA SHEET

Industry: Paper and Allied Products SIC: 26

Machine/Area: Gears

Noise Level before Treatment: 101 dbA

Noise Level after Treatment: 96 dbA

} Operator's Position

Cost of Treatment: $

Treatment and Technology Used: Replaced Steel Gears With Nylon Gears

- Materials: Nylon
- Design Practices: Redesign
- Analysis Techniques:

Deleterious Effects of Treatment: None Indicated

Measurement Techniques Used: Precision Sound Meter Plus Octave Band Analyzer

Sponsor of Work: Industrial

Comments:

Source: K. Raisch, Noise Levels at Rewinder Reduced With Nylon Gears, Pulp and Paper, April 1972

MACHINERY NOISE DATA SHEET

Industry: ______________________ SIC: ________

Machine/Area: Gears

Noise Level before Treatment: }
Noise Level after Treatment: } An 8dB reduction in gear noise was achieved by increasing the diametral pitch from 3 to 14 (spur gears)

Cost of Treatment: $________

Treatment and Technology Used: Increase in Diametral Pitch - Which Also Increased Number of Teeth - Resulted in a Significant Decrease in Gear Noise

- Materials: -
- Design Practices: Redesign
- Analysis Techniques: -

Deleterious Effects of Treatment: -

Measurement Techniques Used: Spectrum Analysis

Sponsor of Work: University

Comments: Sources - 1) Load Fluctuations on the Tooth Caused By the Change of the Number of Teeth Sharing the Load; 2) Elastic Vibration of the Teeth and the Gear Bodies.

Source: A. Y. Attia, Effect of Change of Pitch on Gear Noise, Journal of Sound and Vibration, 8 September 1971, Egyptian Paper

MACHINERY NOISE DATA SHEET

Industry: ______________________ SIC: ________

Machine/Area: Gears

Noise Level before Treatment: } A 6 dB Reduction Can Be Achieved By Reducing the Angular Displacement Error By One-Half

Noise Level after Treatment: }

Cost of Treatment: $________

Treatment and Technology Used: Rubber of Neoprene Bushings; High Face Contact Ratios; Lap Tooth Surface to Provide Uniform Contour; Assemble With Low Angular Displacement Error

- Materials: ________
- Design Practices: Isolation, Close Tolerances, and Accurate Assembly
- Analysis Techniques: ________

Deleterious Effects of Treatment: Increased Cost (Assumed)

Measurement Techniques Used: Spectrum Analysis

Sponsor of Work: Industrial

Comments: Noise Source-Mismatch Between Mating Teeth Which Produces Localized Tooth Contact Area.

Source: L. S. Pitts, Bevel and Hypoid Gear Reduction, SAE Paper No. 720734, Sept 1972

MACHINERY NOISE DATA SHEET

Industry: ______ SIC: ______

Machine/Area: Gears

Noise Level before Treatment: ______ dbA

Noise Level after Treatment: ______ dbA

Cost of Treatment: $______

Treatment and Technology Used: See Other Page

- Materials: See Other Page
- Design Practices: See Other Page
- Analysis Techniques: -

Deleterious Effects of Treatment: -

Measurement Techniques Used: -

Sponsor of Work: Industrial

Comments: Sources: 1) Tooth Meshing Errors; 2) Natural Resonances, 3) Bearing Imperfections; 4) Windage; 5) Sounds from Auxiliary Equipment Such as Lubrication Systems.

Source: W. A. Bradley, Sound Gear Quality, Mechanical Engineering, October 1971

Design Considerations

- Parallel gearing preferred to crossed-axis gearing
- Helical gearing allows more than 1 tooth to be in contact - as much as a 12 dB reduction over spur gears
- Double helical or herringbone gearing require close tolerances
- Gear Design
  - Finest pitch allowable
  - Lowest pressure angle
  - Maximum recess and minimum approach
  - Tip and Root Relief
  - Overlap ratio to be exactly integral - at least 2.0 or greater
  - Backlash must be adequate for thermal centrifugal expansion plus tooth deflection by should not prevent proper contact.
- Use sleeve bearings in preference to anti-friction bearings.
- Alternate hard pinions with soft gears.
- Specify accuracy and surface finishes.
- Use Highest Viscosity Lubricant Possible.

MACHINERY NOISE DATA SHEET

Industry: Fabricated Metal Products SIC: 34

Machine/Area: Electric Motor

Noise Level before Treatment: ______dbA

Noise Level after Treatment: ______dbA

Cost of Treatment: $______

Treatment and Technology Used: (1) Increase Clearance at the end of fan Blade, Avoid Sharp Corner in the Air Passage (2) Smooth Out the Magnetic Flux Pulsation (3) Use of Proper Grade Brush

- Materials:
- Design Practices:
- Analysis Techniques:

Deleterious Effects of Treatment:

Measurement Techniques Used:

Sponsor of Work:

Major Source of Noise
(1) Airstream Noise - Most Significant
(2) Magnetic Noise
(3) Mechanical Noise

Source: Goss, R., "Electric Motor Noise - Control of Noise at the Source" American Industrial Hygiene Association Journal, Jan. [illegible] 1970

MACHINERY NOISE DATA SHEET

Industry: ________ SIC: ________

Machine/Area: Electric Motors

Noise Level before Treatment: ________ dbA

Noise Level after Treatment: ________ dbA

Cost of Treatment: $________

Treatment and Technology Used: (1) Balance Rotor Assy; (2) Bearing Replacement (3) Unidirectional Fan; (4) Motor Mounts; (5) Enclosure

- Materials: -
- Design Practices: -
- Analysis Techniques: -

Deleterious Effects of Treatment: Enclosure Results in Thermal Problems

Measurement Techniques Used: -

Sponsor of Work: Industrial

Comments: See Other Page for Source Information

Source: J. Campbell, Electrical Systems - Designs for Quiet, Machine Design, September 13, 1967

Noise Sources

- Magnetic Noise, Function of:
  - Flux Density
  - Number and Shape of Poles
  - Number and Shape of Slots
  - Air Gap Geometry

- Mechanical Noise
  - Unbalance of the Rotor Assembly
  - Bearings
  - Brushes Riding on Slip Rings
  - Rattling of Loose Components
  - Accidental Rubbing of Stationary Rotating Components
  - Windage Noise Caused By Vortices in the Airstream

MACHINERY NOISE DATA SHEET

Industry: ________ SIC: ________

Machine/Area: Bearings (Anti-Friction)

Noise Level before Treatment: ________dbA

Noise Level after Treatment: ________dbA

Cost of Treatment: $________

Treatment and Technology Used: ________

- Materials: ________
- Design Practices: ________
- Analysis Techniques: ________

Deleterious Effects of Treatment: ________

Measurement Techniques Used: Spectrum Analysis

Sponsor of Work: Industrial

Comments: Sources: (1) Contamination, (2) Brinelling at Assembly; (3) Bearings Becoming Magnetized; (4) Arcing from Stray Electricity Causes Pits.

Source: L. L. Lura and R. B. Walker, Bearing Noise Reduction, SAE Paper 720733, September 1972

MACHINERY NOISE DATA SHEET

Industry: ______________ SIC: ______

Machine/Area: Toothed Belt Drive

Noise Level before Treatment: ________ dbA

Noise Level after Treatment: ________ dbA

Cost of Treatment: $________

Treatment and Technology Used: See Other Page

- Materials:
- Design Practices:
- Analysis Techniques:

Deleterious Effects of Treatment:

Measurement Techniques Used:

Sponsor of Work: University

Comments: Detailed Study With Useful Information for Designer of Tooth (Cog) Belt Drive

Source: A. Kubo, et al, On the Running Noise of Toothed Belt Drive, Japan Society of Mechanical Engineers, September 1971

Treatments

- Use soft material at bottom lands of belt or tooth tip lands.
- Drive with multibelts of narrow widths runs quieter than single, wide belt.
- Slant belt with idle pulley ~15° before it contacts wheel.
- Use barrel shaped wheels
- Reduce (minimize) belt tension
- Maximized center distance
- Minimize speed.

MACHINERY NOISE DATA SHEET

Industry: SIC:

Machine/Area: Headstock Drive

Noise Level before Treatment: 88 to 94.5 dbA } 3 ft From Unit

Noise Level after Treatment: 74 to 85 dbA

Cost of Treatment: $

Treatment and Technology Used: (1) Belt Sheaves Were Trued Up; (2) Air Escape Grooves 1/16 inch Wide Were Cut Around the Drive Pockets; (3) Sheaves Were Balanced; (4) Belt Loosened as Much as Possible

- Materials:
- Design Practices:
- Analysis Techniques:

Deleterious Effects of Treatment:

Measurement Techniques Used:

Sponsor of Work: Industrial

Comments:

Source: D. F. Cummins, Identifying and Reducing Radiated Noise, ASME Paper 73-DE-16, February 19, 1973

MACHINERY NOISE DATA SHEET

Industry: ____________ SIC: ______

Machine/Area: Mechanical Systems

Noise Level before Treatment: ________ dbA

Noise Level after Treatment: ________ dbA

Cost of Treatment: $________

Treatment and Technology Used: See Other Page

- Materials: ____________
- Design Practices: ____________
- Analysis Techniques: ____________

Deleterious Effects of Treatment: ____________

Measurement Techniques Used: ____________

Sponsor of Work: Industrial

Comments: Sources: (1) Rotation With Eccentric Load; (2) Oscillate in Translation or Rotation; (3) Move With Intermittent or Varying Speed; (4) Impact Against Other Parts

Source: R. E. Riffenburg, Mechanical Systems - Designs for Quiet, Machine Design, September 14, 1967

TREATMENTS

Cams

- Smooth Surfaces
- Balance Rotating Parts
- Minimize mass and Area
- Accelerate no faster than system can follow
- Try to use constant acceleration

Gears

- Tight tolerances and fits.
- Use nonmetallic material
- Damp gears

Bearings

- **Journals** - Thick oil film
- **Ball** - Good surface finish
- **Needle** - Good surface finish and oil film

Couplings

- Lubrication of Bearings
- Resilient material around bearings
- Use vibration isolators
    - Vibration break
    - Vibration block
    - Damping Material

MACHINERY NOISE DATA SHEET

Industry: Fabricated Metal Products SIC: 34

Machine/Area: Hydraulic Systems

Noise Level before Treatment: ______ dbA

Noise Level after Treatment: ______ dbA

Cost of Treatment: $______

Treatment and Technology Used: (1) Keeping Pressure and Airtight and Leak Free (2) Making Sure Filters are Properly Functioning (3) Pre-heat Before Starting Pump (4) Reduce Pressure at Relief Valve Until Pump Noise Stops (5) Keep Reservoir Filled (6) Prevent Water Leaks Into System Oil (7) Eliminate Restrictions in Pump Suction Line

- Design Practices: ______
- Analysis Techniques: ______

Deleterious Effects of Treatment: ______

Factors for the Detection of Aeration and Cavitation Noise

(1) Turbulence Resulting From Vib of the Aerated Line
(2) Valve Chatter and Squeal
(3) High-Pitched Hammering in Pump or Motor
(4) Higher Than Normal Temperature . Result of Aeration or Cavitation
(5) Pump Noise on Startup
(6) Cloudy or Frothy Oil
(7) Slamming Cylinders
(8) Air Leak

Source: Hulda, H. J. "A Checklist for Noisy Hydraulics; Why Noise Starts and What to do About it" Construction Machinery Maintenance, July 1974

MACHINERY NOISE DATA SHEET

Industry: Fabricated Metal Products SIC: 34

Machine/Area: Hydraulic Equipment

Noise Level before Treatment: ________ dbA

Noise Level after Treatment: ________ dbA

Cost of Treatment: $________

Treatment and Technology Used: (1) Acoustic Filter or Accumulator for Fluidborne Noise (2) Isolation Mounting for Structureborne Noise (3) Enclosure and Good Reservoir Design for Airborne Noise

- Materials:
- Design Practices:
- Analysis Techniques:

Deleterious Effects of Treatment:

Measurement Techniques Used:

Sponsor of Work:

Basic Forms of Noise (1) Structureborne Noise
(2) Airborne Noise
(3) Fluidborne Noise

Comments: Discussion on Each Treatment Tech.

Source: Becker, R. J. and Skaistis, S. J. "How to Quiet Hydraulically-Operated Machinery and Equipment" Hydraulics and Pneumatics, October 1974 , ,

MACHINERY NOISE DATA SHEET

Industry: ______________________ SIC: ________

Machine/Area: Hydraulic Power Unit for Milling Machine

Noise Level before Treatment: 96 to 98 dbA } 3 ft from unit

Noise Level after Treatment: 83 to 88 dbA }

Cost of Treatment: $__________

Treatment and Technology Used: (1) Dropped Motor RPM to 1200; (2) Used a Flange Mounted Pump; (3) Mounted Pump and Motor on an Isolated Subbase; (4) Rubber Hoses in Line to Reduce Pump Transmitted Noises; (5) Use of Large Manifold Instead of Many Pipes; (6) Used Quieter Pump

- Materials: ______________________
- Design Practices: ______________________
- Analysis Techniques: ______________________

Deleterious Effects of Treatment: ______________________

Measurement Techniques Used: ______________________

Sponsor of Work: Industrial

Comments: ______________________

Source: D. P. Cummins, Identifying and Reducing Radiated Noises, ASME Paper 72-DE-36, February 10, 1972

MACHINERY NOISE DATA SHEET

Industry: ________ SIC: ________

Machine/Area: Hydraulic Systems

Noise Level before Treatment: [illegible] dbA

Noise Level after Treatment: [illegible] dbA

Cost of Treatment: $________

Treatment and Technology Used: See Other Page

- Materials: ________
- Design Practices: ________
- Analysis Techniques: ________

Deleterious Effects of Treatment: ________

Measurement Techniques Used: ________

Sponsor of Work: Industrial

Comments: ________

Source: H. J. Sculthorpe, Industrial Hydraulic Noise Abatement, Sperry Rand Engineering Review, 1970

System Options for Reduced Noise

- Larger pumps run at lower pressures and lower speeds produce less noise than small, high speed, high pressure pumps - they also cost more.
- Fixed displacement pumps are quieter than variable displacement pumps - they are also less expensive
- Avoid large flexible panels which reradiate noise from other components.
- Use subsystem isolation
- Inlet line and all its connections must be absolutely airtight to prevent air ingestion
- Size inlet to minimize cavitation
- Align pump and motor shafts to minimize load on bearings
- Use short straight pieces of hose in inlet, discharge or case drain line.
- Keep oil cool
- Avoid contaminating oil with water

MACHINERY NOISE DATA SHEET

Industry: ______ SIC: ______

Machine/Area: Hydraulic System

Noise Level before Treatment: ______ dbA

Noise Level after Treatment: ______ dbA

Cost of Treatment: $______

Treatment and Technology Used: See Other Page

- Materials: ______
- Design Practices: ______
- Analysis Techniques: ______

Deleterious Effects of Treatment: ______

Measurement Techniques Used: ______

Sponsor of Work: ______

Comments: British Publication

Source: F. J. Wilson, Noise in Hydraulic Systems, The Chartered Mechanical Engineer, September 1971

[illegible]

Source	Treatment
Pump	- Two small pumps are quieter than one large pump. - Never mount a pump rigidly on anything that resembles a sounding board or a drumhead.
Piping	- Avoid sudden changes in direction or section in pipes. - Make sure inlet lines cannot contain air pockets. - Use plastic pipes since they are poor sound conductors.
Valves	- Valves mounted on manifold blocks are usually quieter than when they are individually mounted on a large framework. - Valves should work fast but smooth.

MACHINERY NOISE DATA SHEET

Industry: SIC:

Machine/Area: Hydraulic Systems

Noise Level before Treatment: [illegible] dbA

Noise Level after Treatment: [illegible] dbA

Cost of Treatment: $ [illegible]

Treatment and Technology Used: See Other Page

- Materials:
- Design Practices:
- Analysis Techniques:

Deleterious Effects of Treatment:

Measurement Techniques Used:

Sponsor of Work:

Comments:

Source: J. W. Sullivan, Hydraulic Systems - Design for Quiet, Machine Design, September 14, 1967

Source	Treatment
Pump • Case Resonance • Solid Body Vibration • Pressure Pulse	• Attenuation • Rigid Body, Massive Body • Delay Discharge Port Opening • Controlled Backflow (Both Methods Reduce Volumetric Efficiency) • Use Large Displacement Pump Operating At Low Speed or Discharge Pressure; Noise is More Sensitive to Speed Than to Pressure
Piping	• Keep Velocities Below 15 fps. • Hydraulic Acoustic Mufflers Placed in Line Near the Pump • Correct Size of Pipe and Fittings
Pump + Motor	• Mount on Common Base to Facilitate Alignment and Isolation • Isolate Complete Unit With Resilient Mounts
Controls	• Avoid High Rates of Energy Change in Fluid. • Design Relief Valves and Pressure Regulators for Minimum Throttling Noise • Minimize the use of Actuators With Rapid Changes of Energy Delivery
Reservoirs	• Return Line Should Be Below Oil Level • Include Baffles • Maximize Inlet Lines to the Pump • Elevate or Pressurize Reservoir

MACHINERY NOISE DATA SHEET

Industry: ________ SIC: ________

Machine/Area: Hydraulic Systems

Noise Level before Treatment: ________dbA

Noise Level after Treatment: ________dbA

Cost of Treatment: $________

Treatment and Technology Used: See Other Page

- Materials: ________
- Design Practices: ________
- Analysis Techniques: ________

Deleterious Effects of Treatment: ________

Measurement Techniques Used: ________

Sponsor of Work: Industrial

Comments: ________

Source: J. R. Brennan, Controlling Noise in Fluid Pumping Systems, Plant Engineering, February 21, 1975

Source	Treatment

Aeration
(Entry of gas into the suction line)
	• Seal all leaks of ingested air into the system
	  • Pipe joints
	  • Pump case
	  • Shaft seals
	• All fluid-return lines in the [illegible] reservoir should be below minimum fluid level.
	• Recirculating systems should have air bleed.

Cavitation
(Vaporization of fluid entering the pumping or hydraulic system elements.)
	• Increase suction pressure
	  • Fewer or larger valves and fittings
	  • Larger or shorter pipes
	  • Elevating or pressurizing the system
	  • Lowering the pump
	  • Heating the fluid

Surges	• Add accumulator(s) • Add mufflers
Turbulence	• Increase piping size to decrease Reynolds number

Mechanical Noises	• Treat as in motors
	  • Bearing control
	  • Balanced Rotors
	  • Misalignment correction

MACHINERY NOISE DATA SHEET

Industry: SIC:

Machine/Area: Pneumatic Equipment

Noise Level before Treatment: * dbA

Noise Level after Treatment: * dbA

Cost of Treatment: $ *

Treatment and Technology Used: See Other Page

- Materials:
- Design Practices:
- Analysis Techniques:

Deleterious Effects of Treatment:

Measurement Techniques Used:

Sponsor of Work: Industrial

Comments:

Source: C. H. Anderson, Jr., Design Principles for Low-Noise Portable Pneumatic Equipment, ASME Paper no. 73-DE-16, January 15, 1973

Treatments

Mufflers

- Pipe exhaust away from operator's area
- Use sound absorbing material
- Use acoustic filter
- Use diffusion at the exhaust exit

General

- Use gradual exhaust to reduce amplitude of exhaust pressure pulse
- Use baffles at discrete locations to prevent standing waves
- Use an expansion volume to drop exhaust pressure
- Minimize exhaust air velocity
- Provide a long tortuous path for exhaust
- Use lowest operating pressure that will provide satisfactory performance

MACHINERY NOISE DATA SHEET

Industry: Fabricated Metal Products SIC: 34

Machine/Area: Parts Ejection - Punch Press

Noise Level before Treatment: 106 dbA

Noise Level after Treatment: 93 dbA

Cost of Treatment: $ Unknown

Treatment and Technology Used: (1) Tilted Press 32 deg from Vertical Plane. (2) Reduced Air Pressure (3) Change Ejector from Continuous to Intermittent Operation.

- Materials: -
- Design Practice: Retrofit
- Analysis Techniques: Unknown

Deleterious Effects of Treatment: Unknown (Probably None)

Measurement Techniques Used: Spectrum Analysis

Sponsor of Work: Industry

Comments:

Source: OSHA File No.

MACHINERY NOISE DATA SHEET

Industry: Fabricated Metal Products SIC: 34

Machine/Area: Air Gun

Noise Level before Treatment: 115 dbA

Noise Level after Treatment: 90-91 dbA

Cost of Treatment: $ 0/Unit

Treatment and Technology Used: (1) Reduced Air Pressure From 75 psig to 30 psig

- Materials: [illegible]
- Design Practices: [illegible]
- Analysis Techniques: Unknown

Deleterious Effects of Treatment: None

Measurement Techniques Used: Unknown

Sponsor of Work: Industrial

Comments:

Source: OSHA File 561-6331

MACHINERY NOISE DATA SHEET

Industry: ______________________ SIC: __________

Machine/Area: Enclosure

Noise Level before Treatment: __________dbA

Noise Level after Treatment: __________dbA

Cost of Treatment: $__________

Treatment and Technology Used: See Table

- Materials: __________
- Design Practices: __________
- Analysis Techniques: __________

Deleterious Effects of Treatment: See Table

Measurement Techniques Used: __________

Sponsor of Work: Industrial

Comments: __________

Source: L. F. Yerges, Methods of Noise Control for Machinery Already Installed, NOISEXPO, September 11-13, 1973.

Cost Benefit Analysis

Control Option	Attenuation dBA	Unit Cost per sq ft or each	Productivity Penalty
Absorption	3 - 5	$.50-$2.00	None
Damping	3 - 10	$.20-$4.00	None
Barriers	3 - 15	$2.00-$3.00	Up to 15%
"Glove Box" Booths	3 - 15	$250-$400 ea.	Up to 20%
Machine Enclosures	5 - 30	$4.00-$8.00	Up to 25%
Worker Shelters	5 - 20	$250-$3000 ea.	None

MACHINERY NOISE DATA SHEET

Industry: Fabricated Metal Products SIC: 34

Machine/Area: Damping Material USS Nexdamp

Noise Level before Treatment: N. A. dbA

Noise Level after Treatment: N. A. dbA

Cost of Treatment: $ Unknown

Treatment and Technology Used: Viscoelastic Film Between Two Sheets of Steel

- Materials: Unknown
- Design Practices: -
- Analysis Techniques: -

Deleterious Effects of Treatment: -

Measurement Techniques Used: -

Sponsor of Work: United States Steel

Comments: Attached to Surface Through Contact Cement, Heat Bonding, Pop Riveting, Spot Welding, Bolting

Source: OSHA File 83

MACHINERY NOISE DATA SHEET

Industry: Machinery Except Electrical SIC: 35

Machine/Area: Die Room

Noise Level before Treatment: Unknown dbA

Noise Level after Treatment: Unknown dbA

Cost of Treatment: $ Unknown

Treatment and Technology Used: Installation of Acoustical Curtains

- Materials: Unknown
- Design Practices: Unknown
- Analysis Techniques: Unknown

Deleterious Effects of Treatment: Unknown

Measurement Techniques Used: Unknown

Sponsor of Work: Industrial

Comments:

Source: OSHA File [illegible]

MACHINERY NOISE DATA SHEET

Industry: Utilities SIC: 49

Machine/Area: Power Plant

Noise Level before Treatment: ______ dbA

Noise Level after Treatment: ______ dbA

Cost of Treatment: $______

Treatment and Technology Used: ______

- Materials: ______
- Design Practices: ______
- Analysis Techniques: ______

Deleterious Effects of Treatment: ______

Measurement Techniques Used: ______

Sponsor of Work: ______

Comments: Measurements of noise levels before and after a treatment. See tables next page

Source: [illegible], A. "Noise Problems in Power Plants" Energy and Atom Technology, Volume 25, Number 6, [illegible]

TABLE 1. NOISE LEVELS IN STEAM PIPE SYSTEMS

	Frequency (in Hz) 63	250	1000	4000	16,000
	Noise level (in dB)				
Before noise reduction	126	122	132	135	111
After noise reduction		100	110	122	106

TABLE 2. NOISE LEVELS IN GAS PIPES, BEFORE AND AFTER INSULATION

	Frequency (in 1000 Hz) 0.031a5	0.063	0.125	0.25	0.5	1	2	4	8	16
	Noise level (in dB)									
Before insulation	69	83	80	79	84	89	94	97	96	66
After insulation	63	66	70	74	77	80	83	87	81	50

TABLE 3. STEAM NOISE REDUCTION EFFECTS ON NOISE LEVELS

	Frequency (in 1000 Hz) 0.0315	0.063	0.125	0.25	0.5	1	2	4	8	16
	Noise level (in dB)									
Reduction by 15	99	99	93	86	89	91	100	106	97	83
Complete reduction (100%)	84	94	91	84	80	81	81	79	77	70

TABLE 4 OPERATING TURBINE NOISE LEVELS COMPARED WITH PERMISSIBLE NOISE LEVELS

	Frequency (in 1000 Hz) 0.063	0.25	0.5	1	2	4	8	16
	Noise level (in dB)							
Turbine	97	87	87.5	85	84	87	79	82
Noise standard	97	86	82.5	80	77	75	74	73

MACHINERY NOISE DATA SHEET

Industry: Utilities SIC: 49

Machine/Area: Steam Pipeline

Noise Level before Treatment: ______dbA

Noise Level after Treatment: ______dbA

Cost of Treatment: $______

Treatment and Technology Used: 1) avoid sudden direction change 2) reduce speed 3) make inside of piping smooth 4) insulate the pipe 5) use of reflective silencer

- Materials: ______
- Design Practices: ______
- Analysis Techniques: ______

Deleterious Effects of Treatment: ______

Measurement Techniques Used: ______

Sponsor of Work: ______

Mechanisms which make noises:
1) fluid striking pipe wall 5) reflection
2) turbulent fluid mixing
3) rapid flow rate change
4) shock waves that fluctuate internally

Source: K. Arcuri, Duct Streamline Design To Comply with OSHA Noise, Chemical Engineering, Volume 80, Number 11 [illegible], 197[illegible]

MACHINERY NOISE DATA SHEET

Industry: Utilities SIC: 49

Machine/Area: Diesel Fuel Injection Pump

Noise Level before Treatment: 91 dbA At operator's station

Noise Level after Treatment: 82 dbA

Cost of Treatment: $ unknown

Treatment and Technology Used: SDS* cabinet plus design modifications

- Materials: SDS sheet, acoustic absorbent, angle iron frame
- Design Practices: smaller, stiffer cambox, isolation of cambox from frame
- Analysis Techniques: unknown

Deleterious Effects of Treatment: unknown

Measurement Techniques Used: unknown

Sponsor of Work: Industrial

Comments: Good use of SDS panels; SDS is still under development by the British Steel Corporation

Source: J. Profit, Composites for Noise Control - Sound Deadened Steel, Sheet Metal Industries, January 1974

* SDS = Sound Deadened Steel

MACHINERY NOISE DATA SHEET

Industry: Utilities SIC: 49

Machine/Area: Large Steam Turbine - Generator

Noise Level before Treatment: 100-110 dbA

Noise Level after Treatment: ________ dbA

Cost of Treatment: $________

Treatment and Technology Used: 1) Barrier and enclosure over high pressure turbine 2) pipe insulation and panel to outside of generator

- Materials: Steel or aluminum panels, fiberglass, mineral wool, lead vinyl and aluminum jacket for piping
- Design Practices: ________
- Analysis Techniques: ________

Deleterious Effects of Treatment: ________

Measurement Technique Used: ________

Sponsor of Work: Industrial

Noise sources: 1) feed pump
2) draft fan
3) pulverizers
4) valve

Source: Bannister, R.L. "Large Steam Turbine - Generator Noise Control" Proceedings of Short Courses, Purdue University, May 1975

MACHINERY NOISE DATA SHEET

Industry: [illegible] SIC:

Machine/Area: Various Machinery

Noise Level before Treatment: dbA

Noise Level after Treatment: dbA

Cost of Treatment: $

Treatment and Technology Used:

- Materials:
- Design Practices:
- Analysis Techniques:

Deleterious Effects of Treatment:

Measurement Techniques Used:

Sponsor of Work:

Comments: Identification of noise sources and general method of reduction
See attachment

Source:

SOURCES OF NOISE AND METHODS OF NOISE REDUCTION

Equipment	Source of Noise	Method of Noise Reduction
Heaters	Combustion at burners	Acoustic plenum (10 Bwg plate) Seals around control rods and over sight holes
	Inspiration of premix air at burners	Inspirating intake silencer
	Draft fans	Intake silencer or acoustic plenum
	Ducts	Lagging
Motors	TEFC cooling air fan	Intake silencer Unidirectional fan
	WP II cooling system	Absorbent duct liners
	Mechanical and electrical	Enclosure
Airfin coolers	Fan	Decrease rpm (increasing pitch) Tip and hub seals Increase number of blades Decrease static pressure drop Add more fin tubes (usually limited to replacement items or new facilities)
	Speed Changer	Belts in place of gears
	Motors	Quiet motor Slower motor
	Fan shroud	Streamline airflow Stiffening and dampening (reducing vibration)
Compressors	Discharge piping and expansion joint	Inline silencer and/or lagging
	Antisurge bypass	Use quiet valves and enlarge and streamline piping Lag valves and piping Inline silencers
	Intake piping and suction drum	Lagging
	Air intake	Silencer

SOURCES OF NOISE AND METHODS OF NOISE REDUCTION (CONCLUDED)

Equipment	Source of Noise	Method of Noise Reduction
	Discharge to air	Silencer
	Timing gears (axial)	Enclosure (or constrained damping on case) Silencers on intake and discharge and lagging
	Speed changers	Enclosure (or constrained damping on case)
Engines	Exhaust	Silencer (muffler)
	Air intake	Silencer
	Cooling fan	Enclose intake or discharge or both Use quieter fan
Miscellaneous	Turbine steam discharge	Silencer
	Air and steam vents	Silencer
		Use quiet valve
	Eductors	Lagging
	Piping	Limit velocities Avoid abrupt changes in size and direction Lagging
	Valves	Limit pressure drop and velocities Limit mass flow Use constant velocity or other quiet valves Divide pressure drop Size adequately for total flow Size for control range
	Pumps	Enclosure

MACHINERY NOISE DATA SHEET

Industry: HVAC SIC:

Machine/Area: Centrifugal Chiller

Noise Level before Treatment: dbA

Noise Level after Treatment: dbA

Cost of Treatment: $

Treatment and Technology Used: 1) Reduce the exposure of worker to machinery noise 2) incorporation of on-the-spot acoustical treatment 3) adoption of uniform testing standards for lowering the noise output of components which are assembled to create a centrifugal chiller.

- Materials:
- Design Practices:
- Analysis Techniques:

Deleterious Effects of Treatment:

Measurement Techniques Used:

Sponsor of Work:

Comments: Administration of chiller noise is discussed

Source: Vursagi, F.J. "Machine Room Noise is Getting Attention" Air Conditioning, Heating and Refrigeration News, April 1973

MACHINERY NOISE DATA SHEET

Industry: HVAC SIC: 35

Machine/Area: Fan or Blower (for cooling electrical equipment)

Noise Level before Treatment: ________ dbA

Noise Level after Treatment: ________ dbA

Cost of Treatment: $________

Treatment and Technology Used: Lowering the line voltage to fan or blower

- Materials:
- Design Practices:
- Analysis Techniques:

Deleterious Effects of Treatment: 1) Some circuits are not functioning stable with lower line voltage 2) efficiency of cooling may drop to undesirable limit

Measurement Techniques Used:

Sponsor of Work:

Comments:

Source: Anon, "When Fans or Blower are Noisy, Voltage Reduction May be Unwise Solution", Electronic Packaging and Production, September 197[illegible]

MACHINERY NOISE DATA SHEET

Industry: HVAC SIC:

Machine/Area: Forced Air Furnace

Noise Level before Treatment: 96-97 dbA } at employee's ear

Noise Level after Treatment: 90 dbA }

Cost of Treatment: $ 1500/unit

Treatment and Technology Used: Corrugated metal Enclosure

- Materials: Steel
- Design Practices: unknown
- Analysis Techniques: unknown

Deleterious Effects of Treatment: None

Measurement Techniques Used: unknown

Sponsor of Work: Industrial

Comments:

Source: OSHA File 375